MARINE REVIEW

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AMERICAN SHIP BUILDING CO.

A meeting of the board of control of the American Ship Building Co. (consolidated lake ship yards), consisting of President Brown of Chicago, General Manager James A. Wallace of Cleveland, Secretary and Treasurer Wetmore of New York, Assistant General Manager W. E. Fitzgerald of Milwaukee, and Messrs. A. McVittie of Detroit, R. L. Ireland and Luther Allen of Cleveland and Colgate Hoyt of New York, will be held in Cleveland on Wednesday next, when offices for headquarters in Cleveland and the selection of superintendents for the different plants, as well as chief naval architect, chief of engine designs and other matters will be passed upon. There are a great many important details connected with the transfer of plants, issue of stock, etc., that will require attention and which must necessarily delay general organization. It is probably well to note that there was no struggle of the kind referred to in the newspapers for the presidency of the consolidated companies. It was understood long before the New York meeting of Thursday last that Mr. Brown of the Chicago company was to be president and that James A. Wallace of Cleveland was to have the position of general manager. This consolidation is certainly looked upon as one of the strongest of all the industrials. The outlook for ship building on the lakes was never more promising, and a special trade is looked for in the construction of vessels of Canadian canal dimensions, which will be suited not only to the commerce of these canals but also in the Atlantic coasting trade and in the trade with the West Indies and South America. A sale of 500 shares each of common and preferred stock in the consolidation at $140 was reported from New York on Saturday last. The paid in price for the two—common and preferred—was $120, so that this sale represents an advance of $20.

It is understood that Mr. F. W. Wheeler of West Bay City has finally cleared up the last claim against the West Bay City plant and now has complete control of the works. His friends are saying that in view of this situation, the consolidation interests would have been better off if they had treated with him in making up their organization. Mr. Wheeler was in Cleveland a few days ago and seemed greatly pleased with the satisfactory manner in which his affairs have turned out, but he refused to talk about his position as regards the consolidation. He simply said that there was evidently work enough in sight for everybody. He had several new vessels in view that would undoubtedly come his way and on which work would begin as soon as there was any hope of getting material. He looked for great activity in ship building for a long time to come, so much so that the Bay City Plant could be successfully operated without repair work, and the consolidation would find him a fair competitor.

It is expected that the second dry dock at the West Superior ship yard of the American Ship Building Co. will be completed very early in the season. The excavation, which is the principal part of the work, is practically completed. West Superior may lose the three big steel vessels—a steamer and two barges—that are to be built for the Bessemer Steamship Co., and which are not to be delivered until the spring of 1900. If it is to be the policy of the consolidation to undertake most of the new work at the Cleveland, Lorain and Chicago yards, it would seem that the first move would be to transfer the construction of these ships to one of the lower yards. No work has as yet been done on these vessels at West Superior. It is understood that material for them is to be furnished from Chicago. The Chicago yard has begun work on material for the two barges to be built for the Federal steel interests. These will follow the steamer and barge now on the stocks for the Minnesota Steamship Co., the latter of which will be finished about June 15 and the former about July 15. In building this last steamer and barge at Chicago, pneumatic riveters have been used entirely. It has not been necessary to resort in any way to hand riveting. Thirty-two riveting machines have been in operation on these vessels, and at times the fitters were unable to get up the work fast enough for the machines.

ORE SHIPPING DOCKS.

It is estimated that improvements in ore shipping docks of the Duluth, Mesabi & Northern Railroad at Duluth and the Duluth & Iron Range Co. at Two Harbors, now nearing completion, will result in increased storage capacity to the extent of 35,000 gross tons and a corresponding increase in shipping facilities. These improvements represent a combined expenditure of about half a million dollars. When the work at Duluth is completed the two docks of the D. M. & N. Co., Nos. 1 and 2, will be twins, each having 384 pockets. These two docks will each share the distinction of being the largest ore docks in the world. They are located on St. Louis bay at Duluth. The two docks have an aggregate storage capacity of 112,000 tons, sufficient to load sixteen lake vessels of the largest class. The docks are both on the same slip. The cost of ore dock construction at Two Harbors is greater than at Duluth, as the water is much deeper at the former place and cribs are required. In some places the Iron Range company had to build in 40 feet of water, which makes a lofty structure from the foundation to the top of the dock. The Mesabi company has an average of 10 or 12 feet of water under its Duluth docks, though the slip of course, affords a sufficient depth of water for the largest vessels.

Bids were opened at Detroit a few days ago for the marine postal service for the ensuing season of navigation. C. F. Bielman, owner of the Florence B., bid $18 per day; Ruelle & White, owners of the Rosalie B., bid $14.75 per day; and D. D. McAlpine, owner of the Alma C., bid $19 per day. The contract was all but awarded to Bielman some time ago, but as the result of a protest the matter was reconsidered.

IN STRONGER HANDS.

ANOTHER BIG MINING PROPERTY WITH A FLEET OF SHIPS PASSES TO CARNEGIE CONTROL—SALE OF THE LAKE SUPERIOR IRON CO.

Another step towards the control by a few big steel and iron manufacturing concerns of practically the entire production of iron ore in the Lake Superior region, as well as transportation of the ore, is reported in the purchase of the Lake Superior Iron Co's mines and ships by the Oliver Iron Mining Co., the corporation that represents Carnegie interests in ore. It is estimated that this purchase will give the Carnegie-Oliver interest control of an output of 4,000,000 to 4,500,000 gross tons of ore annually. Probably less than half of this ore is tied up by transportation contracts originally made with the Bessemer Steamship Co. (Rockefeller fleet), so that it is naturally concluded that the time is not far distant when the Carnegie company will be engaged in carrying its own ore in ships added to the small fleets now acquired by the Lake Superior purchase.

The purchase of a control of Lake Superior stock is on a basis of $3,780,000 for the entire property. It is said that the Carnegie-Oliver interest was an eleventh-hour factor in the sale of this big property. The Cleveland-Cliffs Co. was also figuring for it up to the end, but the names of parties entering into the original negotiations are not given out. The Oliver company has acquired 70,000 shares of a total of 84,000 shares at $45 a share. The par value is $25. Sixteen thousand shares of Lake Superior stock, making up the total of 100,000 shares, were never issued. The purchaser has agreed to take the remaining 14,000 shares—difference between the 70,000 shares secured and the 84,000 shares issued—at the same price, $45 a share. In the company's statement for 1897 the real estate and mining property were valued at $1,246,445.61 and the steamers at $600,000. It will be seen that the purchase price represents, therefore, about two for one, as, compared with the 1897 valuation, indicating how rapidly mining property has appreciated under the conditions of the past year or two. The Lake Superior Iron Co.'s fleet consists of the steamers La Salle, Joliet, Wawatam, Griffin, Choctaw and Andaste, each capable of carrying close to 3,000 tons on 17½ feet. The company was the third to mine ore in the Lake Superior region, getting out its first ore in 1858. Its total shipments have been 8,257,714 gross tons. The output in 1898 was 686,563 tons, and the program for this year calls for about the same amount. About 300,000 tons, or less than half, of last year's output was Bessemer ore. It is expected that the headquarters of the company will be removed from Boston to Pittsburg on May 11, when the formal transfer is completed, and that as the terms of the various directors expire they will be replaced by directors chosen by the new owners.

STAND OR FALL WITH NEW BILLS OF LADING.

A final meeting of the executive committee of the Lake Carriers' Association with reference to bills of lading for grain and coal was held in Cleveland, Wednesday, and it was decided, after another lengthy discussion, to make an effort to enforce in the grain trade after June 1 a bill of lading that will contain a detention clause and also a clause that will protect the ship in the matter of delivery, about which there has been some question in the past. The shortage matter is to hold over for the present season, although it is hoped that serious questions of shortage will be settled more readily than in the past by the "committee of control" at Buffalo, recently appointed by the combined elevator interests. It was also agreed that the coal bill of lading, proposed recently, and which provides for demurrage if vessels are not given a dock at which to unload within thirty-six hours after arrival at port of discharge, should go into effect May 1.

It is the general opinion among vessel men that this season, above all others affords opportunity to enforce these new bill of lading provisions, but there is, of course, a struggle to be encountered, especially in the grain trade, and it remains to be seen whether this final action will be carried out. Mr. Harvey D. Goulder, counsel for the association, had been to Buffalo, where he met members of the new elevator committee. He was inclined to the position that difficulties in the grain trade could be settled largely through this committee, without resorting to new provisions in the bill of lading. He rather urged this opinion at the meeting, and a communication from President F. J. Firth of the association was of the same tenor. Other members of the committee were, however, quite settled in the opinion that they had done all they could to bring about an amicable adjustment of differences with the grain interests, but had no positive assurance in the promise that delays and other inequalities from the vessel standpoint were to be settled by the appointment of the elevator committee at Buffalo.

It was also agreed at this meeting, upon a unanimous report from the grain shoveling committee, that all grain shoveling at Buffalo should again go to W. J. Conners at last season's rate, $3.10 per 1,000 bushels.

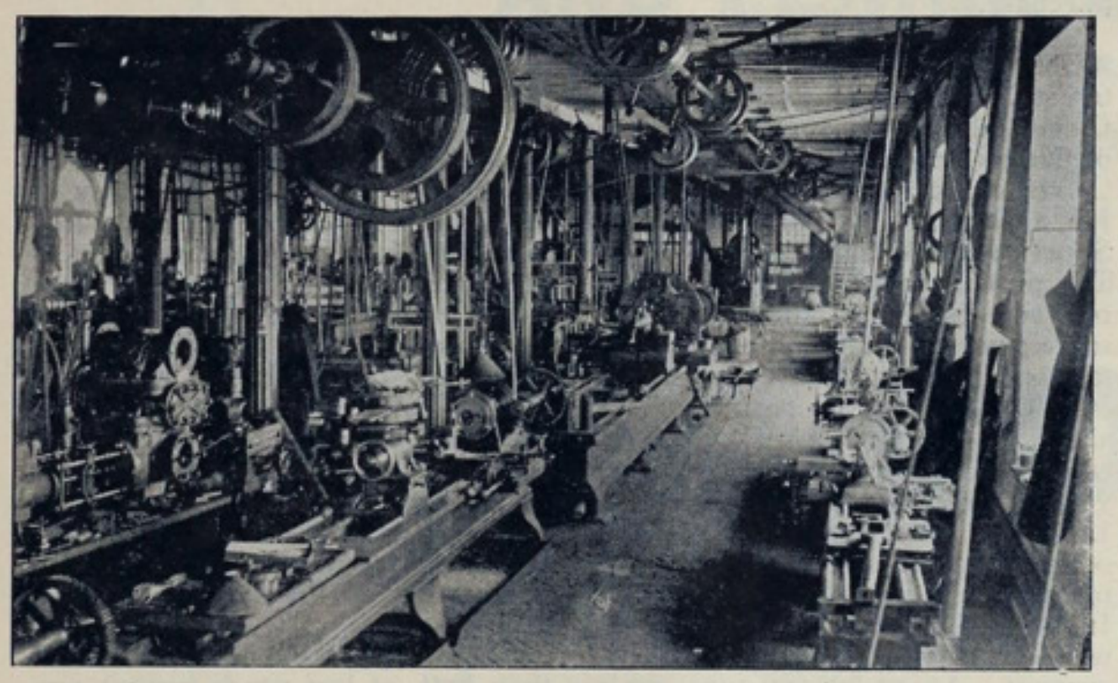
Mr. A. B. Wolvin, who has been in Cleveland for several days past, says that his future as regards the vessel business is still uncertain. He has not closed arrangements with Mr. J. J. Hill of the Great Northern Ry. in the matter of his going to the Pacific coast to undertake the establishment of a line of steamships between Puget sound and the Orient, and his friends say that it is more than probable that he will not go; that he will remain on the lakes, probably locating in Cleveland and managing for the American Steel & Wire Co. the fleet of vessels which he sold recently to that company, as well as others that will undoubtedly be acquired by the wire combination; but as regards the position and the several other enterprises with which his name has been connected, Mr. Wolvin says that he is still undecided.

NORFOLK NAVY YARD.

A GOVERNMENT ESTABLISHMENT WHERE MUCH HAS BEEN ACCOMPLISHED WITH MEAGRE FACILITIES—CONTEMPLATED IMPROVEMENTS INCLUDE A NEW DRY DOCK, FLOATING DERRICK, ETC.

Norfolk, Va., April 26—The ability of the Norfolk navy yard to handle an immense amount of heavy reconstructive and repair work in a most expeditious manner was proven conclusively during the Spanish-American war. The Norfolk yard is one of the oldest in America, and the manner in which operations of considerable magnitude have been carried on here of late with meagre resources reflects great credit upon the officers in charge. As these officers have made such excellent use of the facilities at hand, it is especially pleasing to note that appropriations from the last congress will soon permit of very extensive improvements at Norfolk—more extensive probably than at any other navy yard.

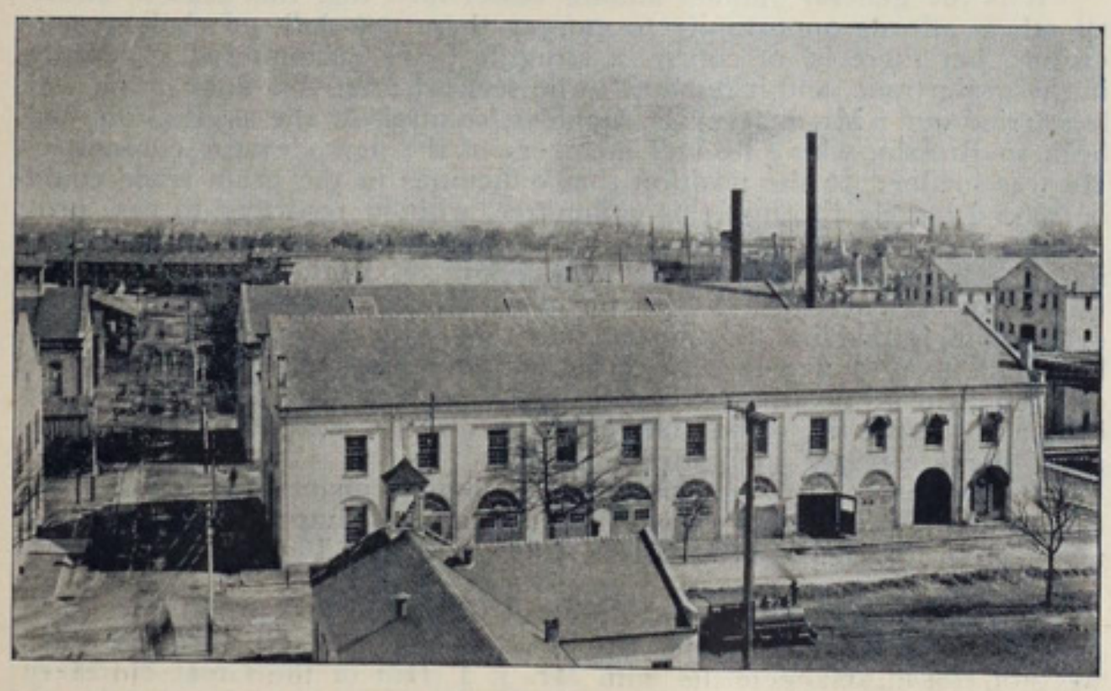
Much of the credit for the achievements in the engineering department is due to Engineer J. A. B. Smith, who is in charge. Mr. Smith has by rearranging machinery and by resorting to schemes of various kinds materially enlarged the machine and boiler shops and has facilitated the movement of machinery between the two shops. Steam for the plant is furnished by a battery of three Babcock & Wilcox boilers, working at a pressure of 160 pounds. The equipment of lathes in the machine shop includes one 48-inch, two 42-inch and one 36-inch, all



MACHINE SHOP AT NORFOLK NAVY YARD.

manufactured by the Niles Tool Works of Hamilton, O., which concern also built the 32-inch lathe with 40-foot bed designed for shafting. There is a large horizontal boring mill and two vertical boring mills of 30 and 36 inches respectively, and of Bullard make, as well as five Gould & Eberhardt shapers and a large transverse shaper manufactured by the Niles Tool Co. An adequate equipment of drill presses and small lathes is also included. The pattern shop is located in one corner of the machine shop.

The foundry is equipped with an electric crane, furnished by Manning, Maxwell & Moore, and which has a capacity of 40 tons with an auxiliary lift of 5 tons. The crane travels the entire length of the building—a distance of 200 feet. Two new cupolas and new blowers were recently installed. The copper shop is fitted with a large tube bender and a hydraulic bending machine for copper pipe. The latter, designed and built at the Norfolk yard a short time ago, has attracted much attention as a most perfect machine of its kind. Upon application of the commandants at the New York and Boston navy yard, the bureau of yards and docks has directed that two more machines of similar design



SCENE IN NORFOLK NAVY YARD.

be built for use at the yards mentioned, while a prominent firm of machinery builders has asked for the privilege of placing the machine on the market. Two large planers, built by John Roach, and which have a swing of 108 inches, invariably attract the attention of visitors in the machine shop. The tool room is supplied exclusively with tools manufactured at the yard, even to twist drills. Every lathe tool is accounted for by an excellent check system. The blacksmith shop is another department in which many improvements have recently been made. A new 10-ton steam hammer, as well as one of smaller capacity, are now in use in this department. There are also in this shop two hydraulic cranes of 5 tons capacity each. The boiler shop equipment is also quite modern.

There was expended at the Norfolk yard during the past fiscal year over $227,000. Of this sum $130,000 was for yard improvements, and about $49,000 for general repairs. The improvements completed during the year included an extension of the quay wall between the timber basin and the marine railway, rebuilding of the machine shop, the installation of an engine and pipe system for fire service, and dredging in front of the yard. The dredging has resulted in a depth of 30 feet at mean low water throughout the entire water front of the yard and covering nearly the full width of the channel. Over $21,000 was also expended in repairs to the timber dry dock. The electric light system at the yard has within the past year been extended to all shops for night work.

Estimates made for the further improvement of this yard contemplate the expenditure of about $2,000,000. Of this sum $1,500,000 is accorded for a concrete and granite dry dock; $100,000 for a quay wall for fitting out basin; $100,000 for the construction of a shipfitters' shop; $70,000 for a floating derrick, and considerable sums for the extension and repair of the blacksmith, coppersmith and machine shops. The location of the Norfolk yard upon waters near Chesapeake bay is said to insure its continual occupancy of one of the most important positions among the navy yards on the Atlantic coast, and for this and other reasons it is claimed that the yard should be fitted with a dry dock capable of accommodating the largest vessels of the navy, present or prospective. The estimate for the dock contemplates one which shall be permanent and substantial in every respect and free from the rapid deterioration, both from the marine worm and the climate of this southern locality. It is stated that dry docks constructed of timber in the latitude in which Norfolk is situated decay very rapidly and are expensive to maintain, and that indeed they also become unsafe if extensive repairs are neglected. The 100-ton shear legs now in use are said to be of very limited value because of being fixed in position and for this reason a 120-ton floating derrick has been recommended as a much needed improvement.

TIMBER OR STONE DRY DOCKS?

From a letter just written to a Pennsylvania congressman by Secretary of the Navy Long it would seem that the question of stone or timber dry docks for the navy will again be taken up in the next congress. The member from Pennsylvania wrote the department in opposition to a timber dry dock at League island. Secretary Long's reply is as follows:

"The department agrees with you as to the desirability of constructing the new dry dock at League island of stone or concrete faced with stone instead of timber, provided the law would admit of the same. The docks, of which this is one, were appropriated for under act of May 4, 1898, which required that all except one should be built of timber. It was decided to build the Boston dock of stone or concrete faced with stone, and during the last session of congress, while the naval appropriation act was under consideration, the department endeavored to secure a clause in this act providing that all the dry docks appropriated for at the previous session should be built of masonry. The recommendation was adopted in part and the navy department was given the option of constructing one more of stone. It having been decided to build the dock designated for the Portsmouth navy yard of the latter material, it is become necessary to design those for the Mare island and League island navy yards to be built of timber. Inasmuch as the question of the proper material to be used in the construction of these docks has now been considered twice by congress, the department does not feel warranted in delaying their construction during the time that must elapse before the fifty-sixth congress convenes in December next. The plans for the dry dock for the League island yard are so well advanced that the work will be advertised in a short time, but by the time that congress meets the work will not have advanced so much as to render it impossible to change its construction should congress so desire, and it is entirely practicable to carry on the work up to that time with advantage, even though so great a change in its structure as from timber to stone should then be made."

SUBSIDY AGREEMENT ANNULLED.

There is much speculation as to the recent action of the British government in serving on the Cunard company notice of the termination of existing agreements regarding American mails and subsidies of the merchant cruiser kind attending these contracts. The agreement with the steamship companies permits of abrogation of contract upon twelve months' notice, but action of this kind now was totally unexpected, in view of the fact that the navy estimates of 1899-1900 provide for an increase of $82,000 in the amount to be paid to the owners of merchant cruisers. The amount has for years been fixed at $240,000, but the present proposition is to raise it to $320,000. The list of ships to which the admiralty has been paying a subsidy for the right of preemption or hire as armed cruisers includes the Cunarders Campania, Lucania, Majestic and Teutonic; steamers Himalaya, Australia, Victoria and Arcadia of the Peninsular & Oriental Co's fleet and the Canadian Pacific company's steamers Empress of India, Empress of China and Empress of Japan. In addition to the eleven vessels mentioned the steamship companies engage to hold at the disposition of the admiralty seventeen others for which no subsidy is paid. Apparently the whole system is to be dropped, inasmuch as the White Star, Canadian Pacific and Peninsular & Oriental companies have all, it is understood, received notices similar to that served upon the Cunard company. The notice in connection with the American mail contracts affects only the Cunard and White Star companies.

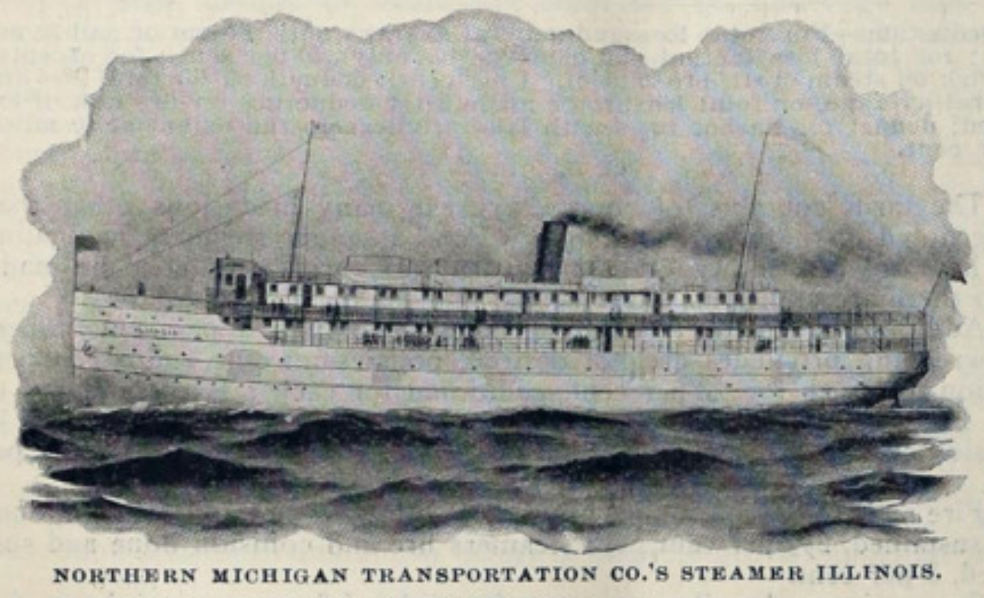
Universal sorrow has been caused in shipping circles throughout the country by the announcement of the death of President H. A. Bourne of the Old Dominion Steamship Co., which occurred in New York last week.

LAUNCH OF THE ILLINOIS.

THE FINE PASSENGER STEAMER BUILDING FOR THE NORTHERN MICHIGAN TRANSPORTATION CO. SLIDES INTO THE WATER AT THE YARD OF THE CHICAGO SHIP BUILDING CO.

There was launched at the yard of the Chicago Ship Building Co. at South Chicago on Saturday last the steel steamer Illinois, building for the Northern Michigan Transportation Co., and which, it is claimed, will be the fastest single-screw freight and passenger steamer on fresh water, and in point of comfort and elegance of equipment equal to the best craft on the lakes. In general appearance the Illinois will not be unlike the Virginia of the Goodrich line as that vessel appears after having undergone the refitting which has been in progress during the winter, both vessels having a tier of staterooms on the hurricane deck. Mr. W. I. Babcock, general superintendent of the Chicago Ship Building Co. has given his personal attention to the preparation of the plans for the new vessel, and to seeing that they are carried out in accordance with his ideas. No expense has been spared to make the Illinois a perfect passenger vessel, one that will be safe, comfortable and speedy and still by no means devoid of beauty.

The Illinois is 240 feet over all, 40 feet beam, 16 feet molded depth and 12 feet draught. Engines will be of the triple expansion type with cylinders 20, 33 and 54 inches in diameter by 36 inches stroke. Steam will be supplied from two Scotch boilers, 12 feet 6 inches in length by 11 feet 6 inches in diameter and allowed a working pressure of 175 pounds. The engines will develop 1800 horse power and are guaranteed to drive the vessel at a speed of 17 miles an hour, while it is probable that with forced draft 18 miles may be easily attained. There will be two dynamos, each



NORTHERN MICHIGAN TRANSPORTATION CO.'S STEAMER ILLINOIS.

with its own engine and carrying a total of 500 electric lights, and a large searchlight will also be provided. The construction is of steel as far as possible, even to the decks, and the hull is divided into six watertight compartments. The cabins will be finished in curly birch with mahogany trimmings and the state rooms in cherry. Hot and cold water will be piped to all staterooms. The cost of the steamer when completed will be in the neighborhood of $250,000.

The new steamer will be ready to go into commission about June 30, and will replace the steamer Charlevoix on the regular Chicago-Mackinac route. The Charlevoix takes the place of the Petoskey and the last named boat will be transferred to the Hart line, which will operate her on Green bay. The Illinois is scheduled to make three round trips per week between Chicago and Mackinac island, stopping at Charlevoix, Harbor Springs and Petoskey. This is in direct competition with the Manitou of the Lake Michigan and Lake Superior line. The Illinois, while not quite as large as the Manitou, will be fully as luxuriously furnished and perfectly equipped. There are accommodations for 200 passengers and 1,500 tons of freight. The steamers Charlevoix and Petoskey of the Northern Michigan company's fleet will continue to run on their present schedule to northern Michigan points, and with the new boat the line will have a daily sailing during the summer from Chicago for Harbor Springs, Charlevoix and Petoskey. The Illinois will be officered as follows: Captain, William Finucan; purser, E. A. Weston; steward, Richard Donnelly; chief engineer, Thomas Collins.

SHIP YARD AT NEW ORLEANS.

The people of New Orleans are still advancing claims for the establishment of a ship building plant in that city. Mr. Robert C. Morris, manager of the southern department of the National Association of Manufacturers, who is one of the prime movers in the project, writes to the Review: "We agree with the Review that everything points to activity in ship building, and as we are badly in need of a ship building plant here we have determinel not to stop until we succeed in securing one. There is such an abundance of surplus cash in the country seeking investment that we are assured that there will be no lack of funds forthcoming. There is a much greater interest here on the part of men of means than ever before, and we will therefore be enabled to take up a larger amount of stock in this city and vicinity. We cannot, however, expect southern people to take all the stock, because of the scarcity of free money and the large number of new industries springing up on all sides in this section. Although we have many assurances of ample support we prefer to have at our disposal an amount beyond rather than under our estimates and will therefore be glad to hear from any persons who feel interested. Our company will probably be capitalized at $1,500,000, which will be sufficient to build a steel floating dry dock and a completely equipped ship building plant."

President McKinley, after a consultation with his cabinet a few days ago, announced his intention of issuing an order permitting the shipment of cargoes to Porto Rico in other than American vessels.

ENGLISH VS. AMERICAN WAGES.

AN AUTHORITY ON THE SUBJECT FURNISHES CONVINCING REFUTATION OF BRITISH CRITICISM REGARDING THE COMPARISON MADE BY MR. CHARLES H. CRAMP.

Some time ago the Marine Review published a comprehensive comparison of wages paid to the various classes of workmen in British and American ship yards, which had been prepared by Mr. Charles H. Cramp of the great Philadelphia ship building firm for presentation before congressional committees having under consideration the Hanna-Payne bill to grant subsidies to American-built vessels. The article was extensively copied in technical publications of the United States and Great Britain, and some of the statements made by Mr. Cramp were severely criticised. These criticisms were not, however, backed up in any case by conclusive evidence on the subject. They have served to arouse Mr. Charles Schofield, superintendent of mechanical work at the Cramp yard, who by reason of his position and certain connections on the other side, is enabled to discuss the subject from a convincing standpoint. Mr. Schofield says:

"My attention has been called to a newspaper article in which a doubtful English authority is quoted as applying the terms 'arrant nonsense' to certain facts published in this country some time ago as to the rates of compensation paid to ship yard mechanics in this country and in England respectively. The statements quoted from the English authority referred to are misleading and calculated to deceive the public. In order to correct or prevent any such result I have compiled some information on the subject which is absolutely accurate.

"I learned the ship building business in England, I have a brother who is a partner in the ship and engine building establishment of Schofield, Hagerup & Doughty, Limited, located at Grimsby, on the east coast of England. I am thoroughly familiar with the rates they pay their mechanics, and these rates are universal in that district. They may be taken as the mean or average rate of wages as between Clyde and Tyne, and Liverpool and London. The schedule which I give of English wages is taken verbatim from the pay rolls of ship yards in the eastern district, centering at Hull; and I have taken the rates paid here in Philadelphia to represent the average in this country, as follows:

PHILADELPHIA PRICES—DAY WORK, 10 HOURS A DAY.

Carpenters	$3.00—12s. 6d.
Fitters	2.50—10s. 5d.
Riveters	2.00— 8s. 4d.
Caulkers	2.20— 9s. 4½d.
Drillers	1.75— 7s. 3½d.
Helpers	1.25— 5s. 2½d.

PIECE WORK PRICES—RIVETING PER 100 IN PHILADELPHIA.

1 inch rivets, shell	$4.00
1 inch rivets, inside	3.50
⅞ inch rivets, shell	3.00
⅞ inch rivets, inside	3.00
¾ inch rivets, shell	2.75
¾ inch rivets, inside	2.75
⅝ inch rivets, shell	2.25
⅝ inch rivets, inside	2.25
½ inch rivets, shell	2.00
½ inch rivets, inside	2.00

HULL, ENGLAND, PRICES—DAY WORK, 9 HOURS A DAY.

Carpenters	5s. 6d.
Fitters	6s. 4d.
Riveters	5s. 3d.
Caulkers	5s. 3d.
Drillers	4s.
Helpers	3s. 4d.

PIECE WORK PRICES—RIVETING PER 100, HULL, ENGLAND.

1 inch rivets, shell	$2.50
1 inch rivets, inside	2.40
⅞ inch rivets, shell	2.08
⅞ inch rivets, inside	2.00
¾ inch rivets, shell	1.79
¾ inch rivets, inside	1.75
⅝ inch rivets, shell	1.50
⅝ inch rivets, inside	1.47
½ inch rivets, shell	1.12
½ inch rivets, inside	1.10

"As I said before this is not guess work on my part, but an absolute transcript from the books of existing and active establishments. Comparison of the rates of wages paid as given above will I think conclusively demonstrate the reason why it costs more to build any given type or class of ship in the United States than in England, without further comment or analysis."

EARLY MARINE ENGINES.

Editor of the Marine Review:—In publishing my paper on "Reminiscences of Steam Engineering in the United States," I feel that it was due to me that you should have given the foot notes also. I was the designer and director of the first steam launch ever operated; the first to put zinc in the hold of an iron vessel, 1844, and in 1847 to put it in a marine boiler, to arrest oxidation of the iron. The putting of zinc in the hold of a vessel was claimed in England twenty years after my application.

CHARLES H. HASWELL.

New York, April 25, 1899.

A dispatch from Duluth states that F. H. Peavery & Co. of Minneapolis will at once begin the erection in Duluth of a 5,000,000-bushel grain elevator, that will cost in the neighborhood of $1,000,000. It is claimed that the construction of this new elevator will give Duluth and Superior a grain storage capacity of 35,000,000 bushels.

HIGH INSURANCE RATES.

POLICIES LESS FAVORABLE ALL AROUND WITH RATE SCHEDULES THAT WOULD SEEM TO ADD 50 PER CENT. TO PREMIUMS—BIGGEST FLEET ON THE LAKES, SOME FIFTY-SIX STEEL VESSELS, TO BE OPERATED WITHOUT INSURANCE.

Fifty-six steel freight carriers, twenty-six of which are steamers and thirty barges, are managed in the office of Pickands, Mather & Co., Cleveland. This entire fleet, owned by the Minnesota Steamship Co., American Steel Barge Co., Huron Barge Co. and Inter-Lake Co., is to be operated during the coming season without insurance. High rates demanded by the underwriters is the cause. It would seem that the whole range of premiums for hull insurance has been almost doubled, and this is true not only of the London market, insuring the steel vessels, but also of a tariff just made public by agents of what are known as the old line lake companies. A tariff covering insurance on coal and ore cargoes, also made public within the past few days, shows advances fully equal to the hull schedule. Vessel owners have understood all along that they would be called upon to pay higher rates of insurance. They know also that this great advance in premiums is not a sharp stroke on the part of the insurance companies to suddenly enrich their treasuries, but is a natural reaction that was certain to follow a long period of unprofitable business on the great lakes. They are disappointed, however, to find that after being unable to get rates of any kind from the underwriters, they are now confronted, at the very moment of being compelled to send out their vessels, with a condition, both as to rates and form of policy, that must necessarily result in a large part of their property going without insurance of any kind.

As the hull tariff adopted by the old line agents has just been announced, little has been done as yet in insuring wooden boats, but the leading Chicago interest, represented by W. A. Prime of Chas. E. & W. F. Peck, has been placing vessels on the London market for several days past. It is understood that the Johnson & Higgins interest of New York city and Buffalo has also been covering in London some of the big lines with which they have had dealings for several years, but the situation compells them to relinquish an important part of their list of ships in the fifty-six steel vessels above referred to. It is probable that on some of the business placed at Lloyds through these agencies a rate of better than 4½ cents on first-class steel steamers has been scured, and that wooden vessels included in the steel fleets have been put in with the latter at some shading of the quoted rates. The form of policy in these cases is also somewhat better than that decided upon by the lake companies, but when it is remembered that steel steamers were placed last year as low as 3 and 3¼ cents, it will be readily understood that the foreign underwriters have been about as stiff as their brethren in this country. There had not in fact been a market of any kind for lake hull insurance, excepting the London market, up to Wednesday of this week when the tariff of the so-called old lake companies was issued. According to this tariff and such other information as can be secured from the lake agents, they offer to write lines on steel steamers at 4½ per cent., with seven-eighths collision and $500 deductable average, but the capacity of the home companies is very probably quite limited, even on this basis. A brief reference to leading features of the lake tariff, which pertains particularly, of course, to wooden steamers, will serve to show the great advance in rates. On A1 wooden steamers valued at $50,000 to $100,000, the rate under a policy including seven-eighths collision and limiting the insurance to nine-tenths of register value, is 6 per cent., but the loss must amount to $2,000, or 4 per cent. average, with one-third off new for old. An A1½ steamer of the same value pays 7 per cent. Barges classing A1 get the same form down to $30,000 value at 7½ per cent. The A1½ barges pay 8¼ per cent. On the low grade vessels the rates are especially high, and will undoubetdly prove prohibitory in nearly all cases. A2 steamers of high value get a rate of 7½ per cent., but as values decrease on this kind of vessel the rates run up to 13 per cent. Barges of the A2 kind begin with 8 per cent. and go up to 14½ per cent., with the limit of insurance as low on the 14½ per cent. rate as two-thirds of the full value. The two-thirds limit prevails also on all B1 vessels. The season of navigation, which has extended to Dec. 12 for two years past, is made to expire Dec. 1 for all wooden vessels. For tugs the season extends to Dec. 10, on account of the peculiar nature of their work. The tariff is as follows:

NET LAKE HULL TARIFF, SEASON OF 1899.

METAL AND COMPOSITE HULLS, YEARLY RATES.

Steamers valued at $50,000 and over	4½ per cent.
Steamers valued under $50,000	5 "
A 1 sail and tow barges	5½ "
A 1½ sail and tow barges	5¾ "
A 2 sail and tow barges	6 "

A1 AND A1½ WOODEN STEAMERS—YEARLY RATES, INCLUDING ⅞TH COLLISION.

Valuation in policy	$100,000 and over.	Average.	$50,000 to $100,000	Average.	$30,000 to $50,000	Average.	Under $30,000	Average.
Limit	9-10		9-10		7-8		6-7	
Steamers A1	5½	3	6	4	6½	5	7	5
Steamers A1½	6¼	4	7	5	7¼	5	7¾	5
Season April 1 to Dec. 1.								

On wooden sail vessels and barges of A1 and A1½ type over $30,000 valuation the rates are 7½ for A1, and 8¼ for A1½, with insurance limited to five-sixths of value; under $30,000 valuation, with limit of four-fifths, the rates are 8 per cent. for A1 and 8½ per cent. for A1½.

Deductions—For total loss and general average only, 20 per cent.; for total loss (actual or constructive only), 30 per cent.; for excepted collision risk on steam and hull, pro rata of, 1 per cent.

A2, A2½ AND B1 VESSELS, SEASON RATES.

Valuation in policy	$50,000 and under $75,000.		$25,000 and under $50,000.		$15,000 and under $25,000.		$10,000 and under $15,000.		Under $10,000.	
Limit of insurance, except B1	7-8		6-7		5-6		4-5		2-3	
	Average.	Rate.	Average.	Rate.	Average.	Rate.	Average.	Rate.	Average.	Rate.
Steamers A2	6	7½	7	8	7½	9	8	10	9¾	13
Steamers A2½	.....	.....	8	10	8	11	9	12	11	14
Limit 2-3 on B1	.....	.....	8	11	9	12	10½	13	13	17
Season April 1 to Dec. 1.										
Sail A2	6	8	7	9½	8	10½	9	12	11	14½
Sail A2½	.....	.....	8	10½	9	12	10	13½	12	16
Limit 2-3 on B1	.....	.....	9	12	11	14½	12	16	14	18½
Season April 1 to Dec. 1.										

LAKE TUGS—SEASON APRIL 1 TO DEC. 10.

	$25,000 and over.	$15,000 and under $25,000.	$10,000 and under $15,000.	$5,000 and under $10,000.	Under $5,000.	Particular Average.
A1 and A1½	3½	4	4¾	5¾	7	5
A2	4	4½	5¼	6¼	7½	6
A2½	.....	.....	6	7	8¾	8
B1	.....	.....	6¾	7¾	9	9

Deductions—For total loss and general average only, steam or sail 20 per cent.; for total loss (actual and constructive only), 30 per cent.; for excepted fire risk on steam craft, pro rata of, 1 per cent.; deductions for total loss and general average, or total loss, to be made after deducting for fire risk, if excepted; deduct for harbor tugs with lake privilege to the extent of 20 miles, 1 per cent.

The tariff contains, of course, a great many provisions other than those noted in the foregoing tables. For passenger steamers navigating one lake only an allowance of 1 per cent. off tariff rates is to be made. Then there are additions, suspensions, extensions, etc., as follows:

Additions—Add for wrecking privileges on tugs, 1 per cent.; where full wrecking privileges are not desired, policies may be endorsed "permission to wreck for ¼ per cent. additional for each service rendered to Oct. 1 and thereafter ½ per cent. for each service rendered." Add for ⅞ collision clause with $500 average on A2 and below wooden vessels, 1 per cent.

Fire and Collision only—A1 and A1½ steamers fire and collision done and sustained, 2½ per cent.; A2 steamers fire and collision done and sustained, 3 per cent.

Suspensions—An allowance may be made of 6 per cent. of the ex-fire season rate for each 30 consecutive days when a vessel is laid up in port during the life of policy, but it is obligatory on the part of the assured to give written notice to the company of said suspension, the policy to remain suspended until written notice is given the company to reinstate the policy. This rebate, however, is not to be allowed while the vessel is subject to or undergoing repairs, the expense of which is participated in by the insurance companies.

Rules—No division on hull and machinery in vessels classed A2 or A1, or A1½ steamers valued under $50,000. No allowance or deduction shall be made for portions of months expired, except as noted below. No more than three months' credit on premiums, and all notes to mature on or before Nov. 1 on season risks; discount for cash at the rate of 6 per cent. per annum.

Extensions—On steel and A1 and A1½ wooden steamers 2 per cent. of premium paid per day after Dec. 1 on wooden and Dec. 5 on steel to complete voyage, providing steamer is at sea at noon twenty-four hours prior to these dates. On A1 and A1½ sail and tow barges 4 per cent. of premium paid per day after Dec. 1 to complete voyage, if at sea. On A2 and below: Steam vessels 2 per cent. and sail vessels and tow barges 4 per cent. of the season rate per day on the form of policy issued, provided vessels are at sea noon of Nov. 30. (Such extensions to be for five days from noon of Dec. 1, provided application be made for such extension before noon of Dec. 1.) On A1 and A1½ steamers and A1 sail, the value in policy not to be less than 80 per cent. of the valuation in the register, and not to exceed register valuation. On A2 steam craft and below, and A1½ sail barges and below, and all tugs, the value in policy not to exceed 90 per cent. of valuation in register nor to be below 80 per cent.

Deductions—Up to Sept. 1 a deduction to be allowed for each and every five days until the policy attaches of 1 per cent. of the full season rate. The last six days of any calendar month of 31 days shall be considered five days only. For risks not attaching until Oct. 1, deduct 40 per cent. of season rate; for risks not attaching until Nov. 1, deduct 55 per cent. of season rate; no deductions for partially expired months of September, October and November.

INSURANCE OF COAL AND ORE CARGOES.

Some of the soft coal shippers were provided with insurance last year on all coal moved from Lake Erie ports to any of the several distributing points on the upper lakes at rates that were said to be as low as 12½ cents per $100 of value. This business was certainly done at a great loss and it is not surprising that the reaction is sharp. The coal cargo business in the new schedule is also graded according to the class of vessel at the following rates: A1 and A1½ steam, 18 cents; A1 and A1½ sail, 20; A2 steam, 25; A2 sail, 30. The decision of the underwriters as to coal cargoes is especially severe on the low-grade vessels. For vessels of the A2½ type, 50 per cent is to be added to the A2 rates, and for B1 vessels 100 per cent is to be added to A2 rates. It is also provided that after Sept. 1 no coal is to be covered by insurance in A2½ vessels going further north than the Sault; after Sept. 1 and up to Sept. 15—the latter date is put down as the fall limit for cargo insurance of any kind in B1 vessels—the rate on coal covered as far north as the

Sault in these low-grade vessels is to be 70 cents for steam and 80 cents for sail.

Insurance charges on ore cargoes, which were said to have been covered last year by blanket policies as low as 7 cents per $100, are also more than doubled up. Following is the schedule: In A1 steam vessels, 15 cents; A1½ steam, 18; A1 sail, 20; A1½ sail, 25; A2 steam, 30; A2 sail (lines limited to $5,000), 50.

UNDERWRITERS NOW AGAINST THE ST. LAWRENCE.

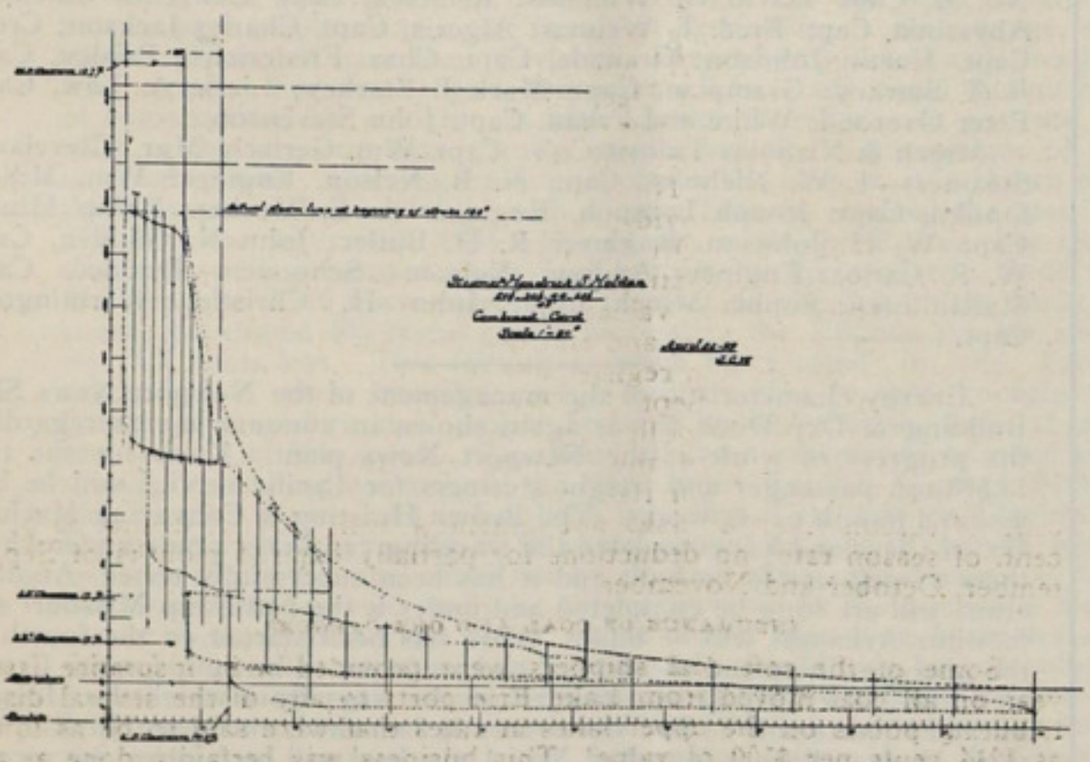
The general trend of feeling in insurance circles occasioned by the heavy losses of the past year is well indicated by the attitude of the marine insurance companies with reference to vessels engaged in the navigation of the St. Lawrence. The feeling in this particular case has, of course, been intensified by the numerous disasters off the Canadian coast, and such has been the effect of the latter as to cause the issuance by Lloyd's of a circular discriminating against steamers bound for Canadian ports. A dispatch from Ottawa says: "The Hon. R. R. Dobell of the Dominion government, who has just returned from a trip to England in connection with the proposed fast Canadian steamship line, had not yet started for home when Lloyds issued their circular upon Canadian risks. He immediately asked them for a meeting to discuss the point, and his request was granted. But on the day preceding that appointed for the meeting news reached London of the loss on the Nova Scotian coast of the Allan steamship Castilian. Mr. Dobell was at once advised that this occurrence would prevent any successful issue of his interview, and he left London without approaching Lloyds at all.

"The disasters of the last year in Canadian waters and the action which they have led to on the part of the underwriters are expected to drive a large number of steamships from the St. Lawrence trade this season to American shipping ports, since owners cannot pay the increased rates of insurance and expect to have any profit at the end of the season. The blow to Canadian shipping interests is all the heavier because the marine department of the Dominion, the boards of trade and harbor commissions of the principal ports, and shipping men generally in Canada have gone to a great deal of expense and trouble of late to advertise Canada's ports and waterways, and to make much of the fact that Quebec is a few hundred miles nearer Liverpool than New York. Forgetful of the dangers of the St. Lawrence route, the Canadian shipping interests were under the impression that, having a shorter route than the United States to Europe, all that was necessary in order to secure the bulk of the North Atlantic carrying trade was a line of mail and passenger steamships as fast as the fastest New York grey hounds and cargo boats equal to the Boston and New York carriers. The difficulty, so far, has consisted in the inability of the Canadian government, with the best terms it could afford to offer, to induce European capitalists to go seriously into the scheme and furnish the money for the building of the ships. What was found difficult of attainment before is likely to prove impossible now."

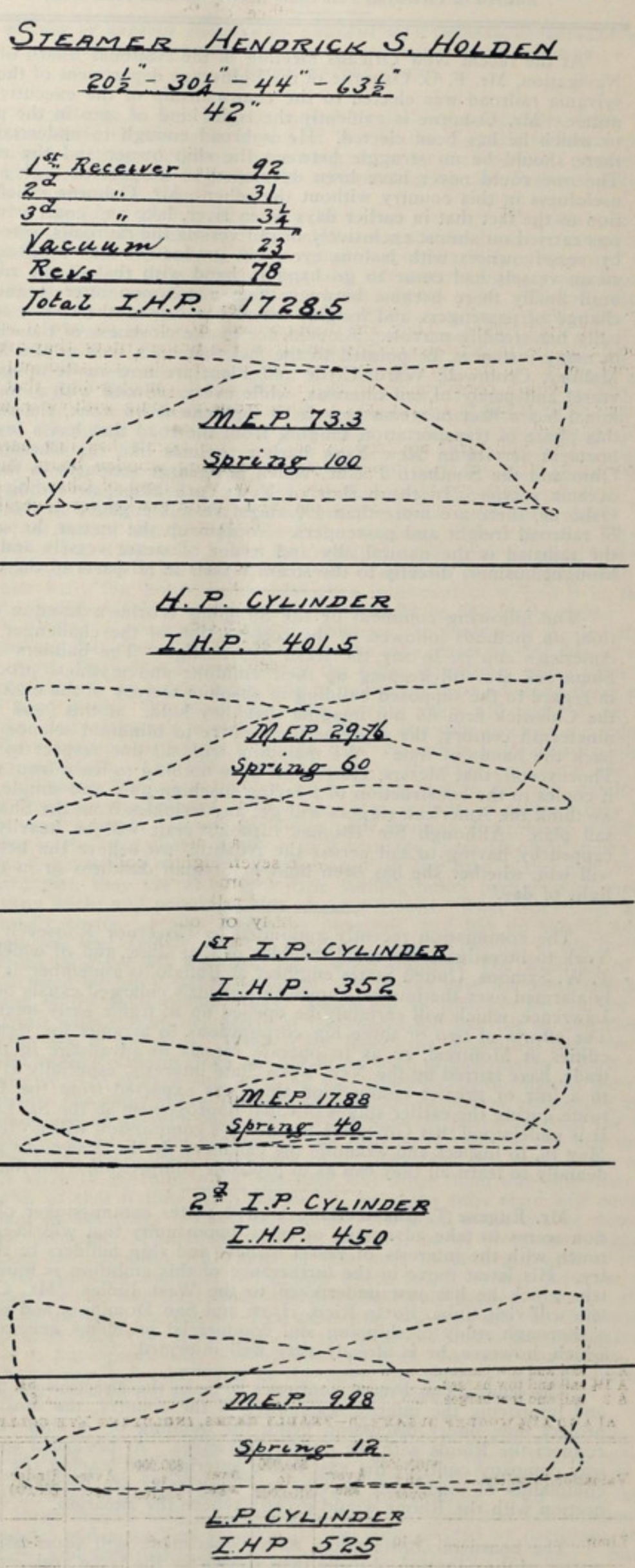
STEAM TRIAL OF STEAMER H. S. HOLDEN.

The steamer Hendrick S. Holden, built by the Globe Iron Works Co., Cleveland, and owned by Capt. John Mitchell and others, is one of the modern iron ore carriers of the great lakes. She is fitted with quadruple expansion engines and Scotch boilers and with the Ellis & Eaves system of hot draft. Engine cylinders are 20½, 30¼, 44 and 63½ inches in diameter with a common stroke of 42 inches. Cards taken out on a recent steam trial of this vessel are presented herewith. In reporting the test to General Manager Newman of the Globe company, Chief Engineer W. N. Howell says:

"The test was begun, according to your instructions, at 3:05, standard time, and continued until 5:00 o'clock, and during this time nine sets of cards were taken from the main engines at approximately 15 minute intervals. The best of these sets, No. 7, with eighty revolutions and 195 pounds of steam, gives about 1,800 H. P., the blower engines making 300 revolutions and giving a vacuum at the fan suction of 1¾ inches of water. The main engines and auxiliary machinery ran smoothly during the trial and gave no trouble whatever. Coal was weighed on a platform scale in the forward bunker and was served to the firemen through the coal bunker doors, 6000 pounds being consumed during the test. No attempt was made to weigh the ashes, as it was found impossible to get rid of the ashes accumulated before the test, owing to the clogging of the ash ejector. The temperature of the gases at the base of the stack was approximately 400 degrees obtained by inserting a ladle containing an alloy (whose melting point was known) into the smokebox just above the air heating tubes.



With an I. H. P. of 1800 and coal consumption of 3000 pounds per hour, the consumption per I. H. P. is 1.66, and this takes no account of auxiliaries. Some trouble was experienced with the air dampers on the furnace fronts and it is recommended that the dampers admitting air below the fire bars be taken out altogether, as they are of no use for regulation and only retard the admission of hot air to the ash pits. It would also be better to close the dampers at the sides of the furnace doors and depend entirely on the upper damper for air above the fire. It will be necessary to adjust the reducing valve which supplies the blower engines with steam, so that they can make 450 turns instead of 300, as at present. This will bring up the vacuum in the fan suctions to 3 inches of water and greatly improve the steaming powers of the boilers. No attempt was made to take cards from the auxiliaries."



Eastern newspaper reports state that Henry G. Morse, who is at the head of the new ship yard which it is proposed to establish on the Delaware river, has purchased a lot of second hand machinery formerly in use at the bridge works of Coffrode & Saylor at Pottstown, Pa.

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At the recent New Orleans meeting of the National Board of Steam Navigation, Mr. F. G. Osborne of the lighterage department of the Pennsylvania railroad was elected to the chairmanship of the executive committee. Mr. Osborne is evidently the right kind of man in the position to which he has been elected. He is broad enough to understand that there should be no struggle between the ship owner and the railroad. The one could never have been developed to its present high stage of usefulness in this country without the other. Mr. Osborne called attention to the fact that in earlier days when river, lake and coast navigation was carried on almost exclusively in sail vessels the railroads were viewed by vessel owners with jealous eyes, but gradually the progression of steam vessels had come to go hand in hand with that of the railroads, until finally there became between them a common interest and interchange of passengers and freight, which has caused the chasm to gradually but steadily narrow. As evidence of the closeness of the affiliation in many instances, he pointed to the fact that lines such as the Morgan, Mallory, Cromwell, Ward, Clyde and Plant are now made up partly of vessel and partly of rail interests, while every railroad with a water terminal has a fleet of steam vessels to supplement its work, the extent of this phase of transportation ranging from the road that has a few ferryboats in service in New York harbor to lines like the Chesapeake & Ohio and the Southern Pacific, which have large steamers in the transoceanic service. In the harbor of New York alone, according to Mr. Osborne, there are more than 400 steam vessels engaged in the transfer of railroad freight and passengers. To sum up the matter, he said that the railroad is the natural ally and feeder of steam vessels and that it brought business directly to the steam vessels in all parts of the country.

The following comment by the Shipping World, a London publication, on methods followed in the construction of the challenger for the America's cup is, to say the least, interesting: "The builders of the Shamrock are still keeping up their childlike and mythical proceedings in regard to the supposed building in absolute secrecy of the craft. Surely the Chiswick firm do not imagine that they hold, at this end of the nineteenth century, the supreme prerogative to blindfold science and put back the hands of time? We maintain, with all due respect to Messrs. Thornycroft, that Messrs. Herreshoff have nothing to learn from us when it comes to the construction of a racing machine pure and simple, nor do we think the American riggers will get any wrinkles from the Shamrock's sail plan. Although Sir Thomas Lipton's craft will be heavily handicapped by having to sail across the Atlantic, we believe the better boat will win, whether she has been built in Stygian darkness or in the open light of day."

The commission recently appointed by Governor Roosevelt of New York to investigate the canal troubles of that state, and of which Major T. W. Symons, United States engineer at Buffalo, is a member, is evidently alarmed over the interest shown in Canada's enlarged canals on the St. Lawrence, which will certainly be opened up to traffic early next season. The efforts of two or three big corporations to arrange for terminal facilities at Montreal, so as to operate vessels to advantage in the canal trade, have stirred up the New York State interests, especially at Buffalo, to a fear of greater competition than was expected from the Canadian route during the earlier stages of canal improvement in the St. Lawrence. It is understood that Governor Roosevelt's commission will go to Canada May 10, to inspect and examine the canals of the St. Lawrence and incidentally to learn all they can as to probable competition from that source.

Mr. Eugene T. Chamberlain, United States commissioner of navigation seems to take advantage of every opportunity that will keep him in touch with the interests of vessel owners and ship builders of the country. His latest move in the furtherance of this ambition is found in the trip which he has just undertaken to the West Indies. Mr. Chamberlain will visit Cuba, Porto Rico, Hayti and San Domingo, and will make a thorough study of shipping and commercial problems generally, with which, however, he is already very well informed.

The tendency in France continues to be in the direction of increasing and improving the interior waterways of the country, the most notable project now under discussion being the building of a ship canal to connect the Rhone with the city of Marseilles. At present a single railway company controls the vast traffic entering and leaving the city, and complaints of inadequate service and high rates are frequent. A connection with the Rhone would greatly relieve the situation.

The board of construction, navy department, will soon take up the matter of the adoption of triple twin screws for the large cruisers recently authorized by congress. There is already evidence of the development of serious opposition to the views of Engineer-in-Chief Melville, who is an enthusiastic advocate of triple screws.

The Chesapeake & Ohio Railroad Co. has announced the adoption of an extensive plan of improvements to be carried out at Newport News, Va. A new elevator will be erected, an additional pier for loading coal constructed and new track laid until the yards will contain a total of fifty-two miles of track.

BRIGHT OUTLOOK ON THE PACIFIC.

San Francisco, April 20.—We have heard out here of late of some eastern men—ship builders and vessel owners—contemplating enterprises of different kinds along shipping lines on the Pacific. They will make no mistake. The opportunities for profitable investment of capital in this direction are of a very attractive kind and will undoubtedly be taken up shortly by strong hands. With a steady increase in the trade to the Klondyke, to Honolulu and to Manila, the demand, especially for steamers, has greatly exceeded the supply. Shipping is prosperous everywhere on this coast and has been for eighteen months past. Sailing vessels in the Siberian trade have been unusually successful. Five vessels are now on the berth taking in cargo for Siberia and fifteen are taking in supplies and canners' outfits, as well as men to do the necessary work in Alaska.

The Santa Fe Railroad has had plans made for a feathering bucket side-wheel ferry of about the size and style of the Philadelphia, a picture of which appeared in the Review of March 30. Hatch Brothers, owners of the Monticello, plying between this place and Mare island navy yard, have drawings for a steel steamer 135 feet long and 30 feet beam. The plans call for 15 knots. The vessel will be used almost exclusively for passenger service, replacing the Monticello, which has become too small for the increasing trade.

The government transports Arizona and Scandia are in port taking on supplies for Manila. They are both large carriers, the Scandia being especially adapted for troop service. Both ships will take troops as well as cargo. Since arrival they have taken on new names. The Arizona will go out as the Hancock and Scandia as the Warren. The Newport of the Pacific Mail Line will return again to Manila. The Lelanaw is also under charter to the government. The latter vessel is under the management of Mr. Jerome from the great lakes. Arthur Hill of East Saginaw is also interested in the Lelanaw, Mackinaw and three other vessels that have been successfully operated in the coast coal trade. Mr. Jerome informs me that two steamers of about 4,500 tons capacity are to be added to his fleet. Occassionally these steamers are used in South American trade.

APPOINTMENTS OF CAPTAINS AND ENGINEERS.

Bradley, M. A., Cleveland: Steamers—Alva, Capt. M. Mulholland, Engineer J. N. Kirby; Geo. Stone, Capt. Chas. H. Francke, Engineer Edwin Black; Hesper, Capt. Jos. A. Holmes, Engineer A. R. Crook; Pasadena, Capt. John H. Wysoon, Engineer A. J. Millet; Gladstone, Capt. Paul Howell, Engineer P. H. Doyle; M. B. Grover, Capt. W. E. Morris, Engineer J. F. Mahaney; City of Cleveland, Capt. B. H. Jones, Engineer Geo. F. Hunt; R. P. Ranney, Capt. Clint Ennes, Engineer Geo. W. Cross; J. S. Fay, Capt. D. Buie, Engineer Dan Conway; F. Kelley, Capt. Chauncey Ney, Engineer W. A. Robbins; S. E. Sheldon, Capt. C. R. Baker, Engineer Jos. Griffin. Schooners—Adriatic, Capt. E. Saveland; Jno. Martin, Capt. Las Lawless; A. Cobb, Capt. N. Gifford; D. P. Rhodes, Capt. W. A. Seeles; T. Quayle, Capt. Fred. Green; Sandusky, Capt. A. B. Parsons; Negaunee, Capt. D. C. Olson.

Davidson, James, West Bay City, Mich.: Steamers—Appomattox, Capt. Hugh Stevenson, Engineer Edward A. Carter; Shenandoah, Capt. Geo. C. Stevenson, Engineer R. E. Walker; Rappahannock, Capt. E. Smades, Engineer E. J. Rae; Sacramento, Capt. Ira B. Mansfield, Engineer C. A. Fletcher; Amazonas, Capt. A. J. Mahon, Engineer Richard Mahoney; Orinoco, Capt. Geo. C. Burns, Engineer Geo. M. Wise; Venezuela, Capt. Geo. W. Starkey, Engineer J. Phelan,; Nicaragua, Capt. Wm. G. Maltby, Engineer Hugh McAlpin; Bermuda, Capt. John McAvoy, Engineer R. H. Rowswell; Monohansett, Capt. Richard Bifield, Engineer John Haller; Robert Holland, Capt. W. L. Montgomery, Engineer J. Wellman. Tugs—Industry, Capt. A. H. Kent, Engineer John Doe; Annie M. Pierce, Capt. John Ross, Engineer Charles Young. Schooners—New schooner No. 91, Capt. Carl Johnson; new schooner No. 92, Capt. David W. Williams; Armenia, Capt. Lawrence Coleman; Abyssinia, Capt. Fred. T. Weimar; Algeria, Capt. Charles Jackson; Crete, Capt. Martin Johnson; Granada, Capt. Chas. Fredericks; Paisley, Capt. F. J. Starkey; Grampian, Capt. Mark J. Starkey; Lizzie A. Law, Capt. Peter Overood; White and Friant, Capt. John Stevenson.

Minch & Nicholas Transit Co's., Capt. Wm. Gerlach, Mgr., Cleveland: Steamers—I. W. Nicholas, Capt. N. B. Nelson, Engineer Wm. Miller; Onoko, Capt. Joseph Lampoh, Engineer A. E. Meeker; Philip Minch, Capt. W. H. Johnson, Engineer R. D. Butler; John N. Glidden, Capt. W. S. Carlos, Engineer Andrew Nelson. Schooners—Dundee. Capt. Martin Elen; Sophia Minch, Capt. John H. Christie; Warmington, Capt. ———.

Energy characteristic of the management of the Newport News Ship Building & Dry Dock Co. is again shown in announcements regarding the progress of work at the Newport News plant. Keels for the two 18,500-ton passenger and freight steamers for Pacific service will be laid within a month or six weeks. The Brown Hoisting & Conveying Machine Co. of Cleveland has completed the traveling cantilever crane under which these vessels are to be built and it has been successfully tested. Another crane will ere long be completed and under it the battleship Missouri and monitor Arkansas will be built. Work has been started on the fourth of the Morgan liners and the first of two steamers to be built for the Cromwell line. They will be constructed on the ways from which the Morgan liners El Norte and El Sud were recently launched, and when El Rio, the third Morgan liner is launched May 1, the keel will be laid for the second of the Cromwell liners.

A representative of Delannay, Belleville & Co. of France, owners of all patents on the Belleville type of water tube boiler, has been in this country for two or three months past, and it is understood that he concluded an arrangement with the Cramps before leaving, subject to ratification by his company, for the manufacture of the boiler in the United States. This engineer also examined the Belleville boilers of lake passenger steamers North West and North Land, and it is understood he commended the workmanship and material, as well as the condition in which the boilers have been placed for the coming season's work.

NEW PROTECTED CRUISERS.

THEIR STEEL HULLS WILL BE COVERED WITH WOOD AND SHEATHED WITH COPPER—NOT HIGH-SPEED SHIPS BUT TO BE BUILT FOR LONG TRIPS WITHOUT COALING AND LONG SERVICE WITHOUT DOCKING.

Chief Constructor Hichborn of the navy, has issued a circular to prospective bidders for the construction of the protected cruisers Denver, Chattanooga, Galveston, Tacoma, Des Moines and Cleveland. The plans provide for vessels of 3,000 tons displacement, sheathed and coppered, with 700 tons coal capacity, 16½ feet draught, and engines capable of driving the vessel at a speed of 16½ knots. The unfortunate blunder of the last congress on the armor plate matter, precludes the possibility of the department going ahead with the new battleships and armored cruisers, and plans for new construction will therefore be confined for the time being to these unarmored vessels. The specifications just issued show that the navy department has departed from its former policy of constructing the fastest and most powerful vessels possible of a given tonnage. In discussing the matter with the correspondent of the Iron Age, Chief Constructor Hichborn said:

"In the building of these vessels the department will provide an entirely new class, which I do not doubt will prove to be one of the most serviceable types ever designed in this or any other country. These ships will be built for long trips without coaling and for long service on stations near or far without docking. In armament they will be well equipped, but no effort will be made to mount the largest possible guns upon them, for the service to which they will be put will require them to be something more than mere gun platforms. The law authorizing the construction of these cruisers contemplates a vessel of about 2,500 tons, but we shall be able to build them somewhat larger, and in this and many other respects they will differ from the Marblehead class, to which it has been erroneously stated they belong. The increased size will be devoted to coal capacity, and the design contemplates the carrying of coal enough to steam 8,000 miles at economical speed. This will mean that these vessels will be available for emergency service for which no other vessels of the navy would be fitted; for in making long voyages they will be independent of coaling stations, which is a most important point in time of war. In point of speed we are now figuring on between 16 and 17 knots, which is somewhat less than the nominal speed of the Marblehead, which is 18 knots. In this connection we believe the department has learned a lesson that will be of special service. Ships of this class built to make 18 knots have their hulls crowded with machinery, which is never fully utilized under service conditions. While the Marblehead is designed to make 18 knots and can do so on a river or perfectly smooth ocean course, as soon as she gets into a seaway her speed is knocked down 2 or 3 knots and she is actually carrying a considerable amount of machinery that develops no service. Now, with the new type we shall devote the space heretofore given to unnecessary machinery to coal capacity, and thus we shall be able to steam much greater distances at as high a rate of speed as vessels of the Marblehead class would be driven under ordinary circumstances.

"Water tube boilers have been decided upon for all these cruisers, though the use of this type will add considerably to the expense of the construction and maintenance of the vessels. Roughly estimating, it is safe to say that water tube boilers for vessels of this size will cost at least $20,000 more than Scotch boilers, and experience has shown that repairs are much more costly. As to effectiveness, however, there can be no doubt of the great superiority of the water tube boiler, and it is also true that when repairs are required they can be much more easily and expeditiously made. As these vessels will be largely used for emergency service, the capacity of the water tube boiler for raising steam quickly will be a great advantage, which we have taken into consideration.

"Perhaps the most radical change in construction methods to be adopted in these new cruisers will be the sheathing of their hulls. In no steam war vessel built for this government has this been attempted, but we have ample evidence of the great desirability of this change, and these cruisers will have their steel hulls covered with wood and sheathed with copper. For more than a dozen years I have advocated this method of construction, for our records have shown its importance, and the results of the late war have greatly emphasized the disadvantages of the unsheathed hull. Quoting from a report on the subject, it is shown that the Atlanta, on her trial trip, with a clean bottom, attained the speed of 15.5 knots an hour with 3,345 horse-power, while the Boston, her exact duplicate, with a comparatively foul bottom on her trial trip made but 13.8 knots on 3,780 horse power; or, in other words, though the Boston's engine developed 435 horse power more than the Atlanta, yet her speed was 1.7 knots less. This fouling is much more rapid in the Pacific ocean and in warm latitudes, and I estimate that in three months the bottom of a modern steel cruiser becomes so foul that she loses at least one-seventh of her speed. Sheathing has been extensively adopted as a remedy for fouling on many of the ships in the English, German, French and Russian navies, and it has been said that if the cruiser Charleston, for instance, with a record of 18 knots, should be sent to Samoa, where for several months she could not be docked, she would become so foul and slow that she could easily be out-maneuvered by the nominally much slower German ship Olga, on whose copper sheathing barnacles and other sea growths could find no footing. It should also be remembered that the steel hulls of vessels are liable to pitting in addition to fouling, and on one occasion an examination of the Dolphin showed that at about the usual load water line a pitted belt, varying from 3 to 18 inches in width, extended from the forward to the after tower. The holes were from 1-16 to 3-16 inches in depth, and as the belts were but 7-16 inch in thickness this became quite a serious matter. With sheathed hulls the new cruisers will be able to stay indefinitely on foreign stations at a distance from docking facilities, which will be a very decided advantage in view of the work cut out for our navy by our recent territorial acquisitions. The sheathing of these vessels would also prove an inestimable advantage for blockade duty. During the recent war the necessity of docking vessels engaged in blockade service was very embarrassing, for ships on such duty must be constantly at their best, as was shown at Santiago, and must be able to hold their positions indefinitely.

"As to batteries we shall not seek to make the new cruisers more powerful than the Marblehead, and shall give them primary batteries of ten 5-inch guns each. The details of the secondary batteries have not yet been decided upon, but will probably include 3-inch rapid fires, 12-pounders, etc. The old style of poop and forecastle will be abandoned and flush decks will be adopted, which will make the ships much more comfortable, providing more space for quarters and making the vessel easier to handle. Altogether we think these new cruisers will constitute a big advance in marine architecture."

LEAKING CONDENSERS.

A SOURCE OF SERIOUS TROUBLE ON ENGLISH WAR VESSELS, ESPECIALLY SINCE THE INTRODUCTION OF WATER TUBE BOILERS—METHODS OF OVERCOMING THE LEAKS.

Accidents to war vessels, caused by leaking condensers, have been discussed at considerable length of late in the English technical press. Several of these accidents have been more or less serious, particularly that to the Cruiser Pegasus. In commenting on the Pegasus' accident the Engineer of London says:

"The fact that her Majesty's third-class cruiser Pegasus recently broke down off Ushant and lay helpless for sixteen hours is not pleasant reading. She was built at Yarrow, and is comparatively quite a new ship. Her condensers leaked, it appears, and salt water found its way into the boilers, which are Reed's patent, of the express type. Violent priming ensued, and until the condensers had been in some way repaired the ship, as we have said, was helpless. The ship returned to port, and it was found that the boilers needed overhauling. This is by no means the first time that condensers have given trouble in the navy. Indeed, many years ago a ship of, as well as we remember, the Tourmaline class, broke down so repeatedly that the chief engineer committed suicide. In this case the tubes of the surface condenser persistently shifted out of the tube plates. Why was never made public. So long as the Scotch boiler was used a little leakage in a condenser did not do much harm. Some vigilance was needed to prevent the deposit of the salts of lime and magnesia to an injurious extent; but the leaks must have been very serious indeed that brought about the stoppage of the engines. The advent of the water-tube boiler has wrought a complete change, however. Although some types may be worked—Yarrow's, for example—with salt water for a few hours, others are quite intolerant of it, and it is, therefore, indispensable that the condensers should be absolutely tight.

"When a condenser leaks the chances are thousands to one that a tube or tubes do not fit water-tight in the tube plates or that one or more is split. Pitting and corrosion of the tubes sometimes takes place, but very rarely. As a rule, tubes may be reckoned upon to stand three years of hard work. We have seen some twenty years old and still serviceable. It is, however, a curious fact that if one tube goes in a condenser others are sure to follow, although it is impossible beforehand to detect any weakness. The leaks usually occur at the tube ends, and are very troublesome, because it involves an hydraulic test to find out which tube or tubes are the culprits. There are three systems of packing tube ends for marine work. In one the tubes pass through compressed wood ferrules in the tube plates; in the second plan they pass through square section india-rubber rings let into recesses in the tube plate; and on the third plan they are fitted into little stuffing-boxes packed with tape or cotton wick, and provided with screwed glands. This latter plan is extremely costly, as may readily be imagined, and has no special advantage save one, namely, that the condenser may be put out of use for long periods and yet will be found tight when wanted. The accuracy of this statement we are disposed to doubt, and in any case the same fact holds good of the india-rubber rings. Balancing all that can be said for and against each system, we arrive at the conclusion that the second method is the best of the three. When it has failed, the reason has been that the india-rubber packing rings did not fit or were of bad quality. Two rings must be used at each end, or in all four times as many rings as there are tubes. The rings are, as we have said, square in section, measuring about one-fourth of an inch each way. They must fit fairly tight on the tube when it is out of the condenser, and also fairly tight in the cell in the tube plate when there is no tube in it. The idea that even if the rings are slack in the tube plate, the tube will force them out until they are tight, or that if they are slack on the tube the tube plate will contract them on the tube, is quite erroneous. No good work can be done on that principle. The rings must, in a word, be of the proper diameter inside and outside. An objection that used to be urged against india-rubber packing was that the grease which found its way into the condenser would ruin the rubber; but this could only happen when the steam passed through the tubes. That plan, curiously enough, was followed in the navy long after it had been given up as bad in the merchant service, and is one reason why stuffing-box packing enjoyed favor. In the present day, however, even in the navy, the water is almost invariably passed through the tubes and the steam circulated outside them."

The steamer Empire, built last year by Lewis Nixon at his Crescent Ship Yard, Elizabethport, N. J., for service on the upper Yukon, is being put together at Seattle, Wash. Dimensions are 80 feet in length, 32 feet beam, 5 feet 6 inches depth and 2 feet 6 inches draught. This vessel, which is barge shaped with a rounding bottom and keel, has six independent engines and propellers working in alleyways divided by partitions at the stern, and will make 14 knots an hour in very shallow water. Similar vessels are in service on the upper Nile.

THE NEW CONTRACTS.

WORK RECENTLY PLACED IN AMERICAN SHIP YARDS GREAT AND SMALL—THE NEW MORSE YARD—PROGRESS OF VESSELS UNDER CONSTRUCTION.

It is understood that numerous improvements and quite probably a considerable enlargement of the plant are in contemplation at the Roach ship yard, Chester, Pa. This is occasioned by the expiration of the 10 years period which John Roach, the ship builder, specified in his will as the length of time that the ship yard should be operated under his name and under the direct management of the heirs whom he left in charge. A reorganization is also expected, but there is every reason to believe that John B. Roach will continue at the head of the company and that the vice presidency or possibly some even more prominent position will fall to the lot of Mr. W. C. Sproul, whose energy has been largely instrumental in securing the large number of valuable contracts booked by the Roach yard within the past year.

Bids received by James B. Quinn, United States engineer at New Orleans, La., for a dredge boat for service at Sabine Pass, Texas, were as follows: Item 1, wood hull; 2, steel hull. The Bucyrus Co., South Milwaukee, Wis., 1, $105,800; 2, $122,000; Iowa Iron Works, Ltd., Dubuque, Iowa, 1, $108,900; 2, $120,000; Mississippi Valley Construction Co., St. Louis, Mo., $119,700. All these bids being in excess of the available appropriation of $99,000, the specifications will probably be revised and new bids invited.

Charles R. Suter, United States engineer at Boston, Mass., has received bids for the construction of a steam launch as follows: Geo. Lawley & Son Corporation, O and First streets, South Boston, Mass., $6,950; Fall River Engine Co., Weymouth, Mass., $8,200; Edward S. Clark, 21 Coleman street, Dorchester, Mass., $6,874; John M. Brooks, 29 Coleridge street, Boston, Mass., $7,500; John Stuart & Co., Wollaston, Mass., $7,900; the O. Sheldon Co., 340 First street, South Boston, Mass., $5,980.

Nothing definite has as yet been done regarding a site for the $3,000,000 ship yard to be established by Henry G. Morse, late president of the Harlan & Hollingsworth Co., Wilmington, Del., although several prospective locations on the Delaware river seem to have the preference. Mr. Morse states that over $12,000 worth of machinery and more than a million feet of lumber have already been purchased and some of it will be delivered within fifteen days.

William McKie of East Boston, Mass., has launched the ferryboat building for the Boston, Revere Beach & Lynn Railroad. She is 142 feet length over all, 47 feet beam over guards, 12 feet depth of hold at center, and is built of the best white oak, hard pine and live oak. Her engine is to be of the condensing beam variety, 36 inches diameter of cylinder. Much of the machinery was manufactured by the Atlantic Works, at East Boston, Mass.

Preparations are being made at the yard of the Harlan & Hollingsworth Co., Wilmington, Del., for the launch of the United States torpedo boat Stringham in the near future. The last launch of a naval vessel at Wilmington was the monitor Amphitrite, which went into the water in 1892. Work on the Stringham is at such an advanced stage that her trial could take place within a few days of the launch were it so desired.

The Enoch Moore Sons Co., Wilmington, Del., has secured from Capt. R. W. Lute of Hainesport, N. J., the contract for a steam barge 125 feet in length, 24 feet beam and 8½ feet depth, which will be used by Capt. Lute for service in New York harbor. The Enoch Moore Sons Co. also have the contract for a launch 35 feet long and 7 feet beam for Senator Stephen Slaughter.

The Northside Iron Works Co., Brooklyn, N. Y., is building a steam yacht from designs by Joseph Enderlin of North Sixth street, Brooklyn. The name of the owner has not been made public. The vessel will be 35 feet over all, 30 feet on the water line, 8 feet beam and 4 feet 8 inches draught. Compound engines will be installed.

The Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated, have contracted with the New York Dock Board for the construction of a small steamer. Her dimensions will be 110 feet over all, 21 feet beam, and 12 feet depth. She will cost when completed $59,500 and will be used exclusively for harbor work.

The tool house and other small buildings at Rilatt Bros'. ship yard, Camden, N. J., was damaged by fire last week. A fire at Bath, Me., some days ago threatened the destruction of the plants of Arthur Sewall & Co. and the New England Ship Building Co., but the damage sustained was very small.

Tarr & James and A. D. Story, Essex, Mass., ship building concerns, are crowded with work. At the former yard the schooner building to replace the Juniata will be launched within a short time, while the schooner Niagara is well under way. A. D. Story has three wooden schooners on the stocks.

The Sharptown Marine Railway Co. of Salisbury, Md., has been organized with a capital of $15,000 and will at once erect a set of ways capable of hauling out vessels of from 600 to 800 tons capacity, as well as refitting the present marine railway and putting it in condition for immediate use.

The Brooklyn Floating Dock & Shipyard plant of Theo. A. Crane's Sons at Erie basin, has secured the contract for the construction of eight covered barges for the New York Central Railroad; eight barges for H. B. Moore, Sr., and a tug for the William H. Beard Dredging Co.

The yacht building at the yard of the John N. Robins Co., Erie Basin, N. Y., for Messrs. D. W. and A. C. James will be christened the Aloha. She will be 160 feet over all, 120 feet water line, 26 feet 9 inches beam, 15 feet deep and 14 feet draught.

Capt. E. J. Howard of Evansville, Ind., has secured a contract for the construction of two steamers for the Lee line of Memphis. Each vessel will be 220 feet in length, 36 feet beam, and 6 feet depth, and will cost in the neighborhood of $50,000.

The East Side Docking Co. of Mobile, Ala., is building a steamer to cost in the neighborhood of $25,000 for service on the Tombigbee river. She will be 170 feet in length, 32 feet beam, and will be owned by Jefferson Staples and others.

C. Henniger, proprietor of the Ballard Ship Yard & Marine Ways at Ballard, Wash., reports a rush of repair work. His works are the largest of the kind on Puget Sound.

The steam yacht Josephine building for P. A. B. Widener at the yard of the Neafie & Levy Co., Philadelphia, was launched last week..

Peck Brothers of Golconda, Ind., are building a steamer 100 feet in length, 19 feet beam and 4 feet depth of hold.

INADEQUATE LIGHTING OF SAULT RIVER.

Capt. George P. McKay, chairman of the committee on aids to navigation of the Lake Carriers' Association, had a conference in Detroit, a few days ago, with Commander Duncan Kennedy, U. S. N., inspector of the eleventh light-house district, relative to placing more gas buoys or other lights in the St. Mary's river. The vessel owners are, of course, anxious to be relieved of the expense of maintaining private range lights in the St. Mary's river. Capt. McKay found that Commander Kennedy now has a full supply of gas buoys for his district and is willing to do all he can towards improving the system of lights on the Sault river, but it is the old story of a lack of equipment in the way of light-house tenders on the lakes. It would seem that the light-house officials at Washington could make some arrangement whereby a couple of vessels could be chartered for light-house supply work, pending the construction of new tenders. The vessel owners must go ahead paying again this year for the maintenance of private range lights in the lower river, but it is hoped that before the season is at an end Commander Kennedy will have established some of the buoys and crib lights that are contemplated.

Capt. McKay took with him to Detroit suggestions from the ship masters as to points in the St. Mary's river where gas buoys were desired. It was proposed to replace with lighted buoys black stake No. 7, off Point aux Frenes; also black stake No. 13 at the turning point of the channel just above the Encampment; also the black stake opposite gas buoy No. 24 in the "Dark Hole," and black stake No. 5 off Harwood point, the turning place at the head of Little Mud Lake. Commander Kennedy said that although he has the necessary buoys now on hand in Detroit, it is impossible to take up the work, for the simple reason that he has not at his disposal the light-house tender necessary. He has at present but one boat for this work, and with the duties of carrying coal to the various light-houses and fog signal stations in the district, and attending to the buoys already in use, the vessel has more work than she can attend to. The new lake tender for which congress has made appropriation will be stationed at Chicago. Capt. McKay urged upon Commander Kennedy the advisability of chartering some vessel for temporary service as a tender, and the commander promised to see what could be done on this score.

Capt. McKay has also addressed to Commander C. O. Allibone, U. S. N., inspector of the ninth light-house district, with headquarters at Chicago, a letter calling his attention to the fact that there is a universal desire on the part of lake masters to have the Simmons reef light ship moved to Lansing shoal and the Lansing shoal gas buoy placed on Simmons reef. The argument of the masters in support of this change is that the light ship with its fog signal would locate the turning point for them in hazy or foggy weather and that the gas buoy would answer the same purpose at Simmons reef.

PROGRESS IN GERMAN SHIP BUILDING.

The French consul at Hamburg transmits to his government a summary of the "Germanischer Lloyd" figures covering the German ship building industry in 1898. These figures give the number of vessels built and building in German yards during the year at 528, with a total register of 546,461 tons. Of these 333 vessels of 208,835 tons were completed at the end of the year, and out of this number 309, representing a tonnage of 181,102 tons, were intended for the merchant marine. These figures place Germany second only to Great Britain as a ship building nation, the Lloyd figures for other important ship building countries having been: England, 761 vessels launched, measuring 1,367,650 tons; United States, 162 vessels of 173,250 tons, and France, 48 vessels of 67,160 tons. Italian ship yards launched 19 vessels of 26,530 tons during the year; Norway built 29 of 22,670 tons, and Holland and Belgium together 32 vessels of 20,301 tons.

Three vessels launched in German yards in 1898 were registered at more than 10,000 tons—the Pretoria of the Hamburg-American Line, being built by Blohm & Voss of Hamburg, 12,800 tons; Kaiser Friedrich, Norddeutscher Lloyd, being built by the firm of Schichau of Dantzig, 12,481 tons, and the Bulgaria, Hamburg-American, by Blohm & Voss, 10,236 tons. The vessels building in German yards and still incomplete on Dec. 31, 1898, numbered 195 and had a total measurement of 337,626 tons. Nearly all of these vessels are to be delivered some time during the current year. There are under construction six vessels at the Blohm & Voss yards and six at the Vulcan yards in Stettin, each of which when completed will be of more than 10,000 tons register. The Lloyd figures also show that 84 vessels of 85,811 tons were ordered from German yards during the year on foreign account.

Orders for over 60 electric cranes have been received since Jany.1 by Pawling & Harnischfeger of Milwaukee. Among those most worthy of mention are ten for the Baltic wharf, St. Petersburg, ordered by the Russian government; four for Honolulu, the Honolulu Iron Co.; one 15-ton crane for Vienna, Austria; five for Lukens Iron & Steel Co.; five for the Midvale Steel Co., Nicetown, Philadelphia; four for the Bethlehem Iron Co., and five electric hoists for the Carnegie Steel Co. The Milwaukee firm is building an addition, 125 by 70 feet, to their present plant, every machine of which is running twenty-three hours a day.

ABOUT THREE-QUARTERS OF A MILL.

COST PER TON PER MILE OF MOVING FREIGHT ON THE GREAT LAKES AS SHOWN BY WAR DEPARTMENT STATISTICS OF ST. MARY'S FALLS CANAL TRAFFIC.

Especial attention has been directed to the low cost of transportation on the great lakes by the annual reports of the army engineer force in charge of the St. Mary's Falls canal. It was admitted that the transportation charges of the great lakes were the lowest to be found anywhere in the world, when these reports, a few years ago, showed a cost of a fraction less than a mill per ton per mile on all freight moved through the canal, as against about 4¼ mills on the trunk line railways. Now this cost is down to practically three-quarters of a mill. The exact figure as shown by the discussion of 1898 traffic just at hand from Col. G. J. Lydecker, United States engineer corps, is 79-100 of a mill, against 83-100 of a mill in 1897, 99-100 in 1896, and 1.14 mills in 1895. The report containing these figures is what is known as the "miles ton" report. It is made up during the winter period by the clerical force in the canal office. The principal features of this report for 1898 will be found in the following summaries:

TABLE SHOWING THE ESTIMATED VALUE OF FREIGHT TRANSPORTED THROUGH CANALS AT THE SAULT, (CANADIAN AND AMERICAN), SEASON OF 1898.

Items.	Designation	Quantity.	Price per unit.	Valuation.
Coal, anthracite	Net tons	540,843	$ 4 75	$2,569,004 25
Coal, bituminous	Net tons	3,235,607	2 40	7,765,456 80
Flour	Barrels	7,778,043	4 25	33,056,682 75
Wheat	Bushels	62,339,996	80	49,871,996 80
Grain (not Wheat)	Bushels	26,078,384	50	13,039,192 00
Manufactured iron	Net tons	214,187	50 00	10,709,350 00
Pig iron	Net tons	35,983	13 25	476,774 75
Salt	Barrels	301,560	75	226,170 00
Copper	Net tons	124,226	240 00	29,814,249 00
Iron ore	Net tons	11,706,960	3 00	35,120,880 00
Lumber	M ft. BM	895,485,000	14 50	12,984,532 50
Silver ore	Net tons			
Building stone	Net tons	4,670	10 00	46,700 00
Unclassified freight	Net tons	623,146	60 00	37,388,760 00
				$233,064,739 85

Average value per ton of freight for season of 1897.....$11 50
Average value per ton of freight for season of 1898..... 10 98

RELATIVE VALUES OF DIFFERENT COMMODITIES.

Coal (hard and soft)	4.4 Per cent.
Cereals (grain of all kinds; also flour)	41.2 "
Iron (iron ore, pig iron, manufactured iron)	19.9 "
Copper	12.8 "
Lumber	5.6 "
All other products	16.1 "
	100.0

It will be observed from the foregoing table that the cereals are far the most important in valuation, amounting to 41.2 per cent. of the whole; this is followed by iron with a valuation of 19.9 per cent; copper, 12.8 per cent; lumber, 5.6 per cent; while coal comes last with 4.4 per cent. This accounts for 89.9 per cent of the entire traffic, the balance of 16.1 per cent being made up of articles unenumerated and those of unclassified freight.

COST OF CARRYING FREIGHT TRANSPORTED THROUGH ST. MARY'S FALLS CANAL, MICHIGAN, AND SAULT STE. MARIE CANAL, CANADA, DURING THE SEASON OF 1898.

Items.	Unit.	Quantity.	Price per Unit.	Amount.
Coal	Net tons	3,776,450	$0.25	$944,112.50
Flour	Barrels	7,778,043	.10	777 804.30
Wheat	Bushels	62,339,996	.02	1,246,799.92
Grain	Bushels	26,078,384	.02	521,567.68
Manufactured iron	Net tons	214,187	1.40	299,861.80
Pig iron	Net tons	35,983	1.05	37,782.15
Salt	Barrels	301,560	.15	45,234.00
Copper	Net tons	124,226	2.00	248,452 00
Iron Ore	Net tons	11,706,960	.60	7,024,176.00
Lumber	M. ft. M. B.	895,485,000	1.65	1,477,550.25
Silver ore and bullion	Net tons			
Building stone	Net tons	4,670	1.50	7,005.00
M. Merchandise	Net tons	623,146	2.40	1,495,550.40
				$14.125,896.00

Results obtained other than those shown in foregoing table were as follows: Average distance freight was carried during 1898, 842.6 miles, which is 1.3 miles more than during 1897; total cost of freight transportation in 1897, $13,220,099.84, against $14,125,896.00 in 1898, as shown by above table; total mile tons in 1898, 17,891,597,030; average cost per ton for carrying freight, 66.5 cents.

If we divide the total amount of freight paid in 1898, as shown in the above table—$14,125,896.00—by the total mile tons—17,891,597,030,—we find that the cost per ton per mile is 79-100 of a mill.

Of 856 registered crafts using the canal in 1898, 523 were steam and 333 sail. These vessels were divided as between Canada and the United States as follows:

AMERICAN REGISTERED CRAFT USING CANALS, SEASON 1898.

Class.	No.	Registered Tonnage.	Freight Tonnage.	Passengers.	Valuation.
Steamers	472	529,924	14,149,858	18,350	$ 358,848.00
Sails	318	273,996	6,609,134		93,150.00
Total	790	803,920	20,758,992	18,350	$ 451,998.00

CANADIAN REGISTERED CRAFT USING CANALS, SEASON 1898.

Class.	No	Registered Tonnage.	Freight Tonnage	Passengers	Valuation.
Steamers	51	24,794	419,208	25,076	$ 22,288.00
Sails	15	8,505	44,023		2,631.00
Total	66	33,299	463,231	25,076	$ 24 919.00

It will be noted that the number of Canadian crafts, as well as the freight carried by them, is very small. There were 286 passages of unregistered craft—51 Canadian and 235 American. These unregistered vessels carried 12,441 tons of freight, of which 8,925 tons was in the American vessels and 3,516 tons in the Canadian vessels.

Canadian freight of all kinds—466,747 tons—was only 2.2 per cent of the total freight for the season. The total of passages for the season was 17,761, and 3,431 of these were by 78 crafts under 100 tons register.

The greatest number of miles run during the season—43,718 miles—is credited to the propeller Samuel Mitchell of the Cleveland Rolling Mill Co.'s fleet, Cleveland. The greatest amount of freight carried by a single vessel—138,726 tons—is to the credit of the propeller Empire City of Duluth, now owned by the American Steel & Wire Co. The same vessel has to her credit the greatest number of miles-ton for the season, amounting to 126,266,531.

The largest single cargo carried by a propeller during the season was carried by the steamer S. F. B. Morse, of the Bessemer Steamship Co. of Cleveland—7,280 net tons.

The largest single cargo carried by a sail vessel is to the credit of the barge John A. Roebling, also of the Bessemer Steamship Co. of Cleveland—7,840 tons.

The United States canal was open 241 days; the Canadian canal 243 days. The record shows that vessels were delayed at the canal 17,311 hours and 31 minutes, an average of 58 minutes, 29 seconds. The railway swing bridge was delayed by vessels 1 hour and 7 minutes. No vessel was delayed by the bridge.

The canal postoffice handled 72,048 letters, 3,663 postal cards, 4,555 newspapers and 263 parcels during the season. Of these 581 pieces were uncalled for and were returned to the citv postoffice.

OIL BARGE LAUNCHED.

THE VESSEL BUILDING FOR THE STANDARD OIL CO. AT THE WORKS OF THE AMERICAN STEEL BARGE CO., WEST SUPERIOR, WIS., GOES INTO THE WATER.

The yard of the American Steel Barge Co. at West Superior, Wis., which has turned out a couple of oil barges for use by the Standard Oil Co. on the Atlantic as well as the great lakes, was the scene this week of the launch of another vessel of this type. Its construction was hastened by the decision of the government not to return to the Standard Co. the oil barges and tank steamers purchased during the Spanish-American war and fitted for use in supplying the vessels of the West Indian fleet with fresh water. The vessel now nearing completion at West Superior is 210 feet over all, 200 feet keel, 38 feet beam and 17 feet moulded depth. She is to have a capacity of about 632,000 gallons of oil on a draught of 14 feet, even keel. She is constructed of steel, of 60,000 to 70,000 pounds tensile strength, with an extension of 20 per cent in eight inches. The vessel has no center line bulkhead, but is divided 'thwartships into six tanks, having a cofferdam for water at forward end to prevent any leakage of oil or gases from getting to the boiler. The boiler is placed at the forward end, with the smokestack leading into foremast. An expansion trunk 114 feet long extends over oil tanks to take care of the expansion of oil at varying temperatures. The pumps are placed aft, away from boiler, in order that gases which might be generated may be kept away from a source of ignition, and the steam pipe connecting pumps to boiler leads along the inside of gunwale on upper deck and is covered with Magnesia sectional covering and fitted inside of an outer, or protective pipe, in order to get as dry steam as possible to pumps. The three steel masts are fitted with sails and steel wire rigging, the shrouds being set up with deadeyes and lanyards, which in the case of foremast used for a smokestack is a necessity, on account of expansion, and which would have a bad effect on rigging set up with turnbuckles.

The steel deck house aft will contain accommodations for captain mate, steward and crew, together with mess room and kitchen and entrance to pump room. This is the fourth vessel of this type built by the American Steel Barge Co. for the Standard Oil Co., the three former vessels having been constructed under the inspection and supervision of D. E. Ford, then representing the Standard company as inspector, while in this latter case Mr. Ford is the constructor himself, as superintendent of the American Steel Barge Co. A steam windlass and steam capstan for this vessel have been supplied by the American Ship Windlass Co. of Providence, R. I.

GREAT LAKES REGISTER—SALVAGE ASSOCIATION.

Chicago, April 27.—"I know nothing of the insurance struggle that is now going on around the lakes," said a representative of the Great Lakes Register when the matter of high rates was referred to. "I want to know nothing of it. Our greatest difficulty has been to remove from the minds of the vessel owners the thought that the Register has anything to do with the business of insurance, but we are now succeeding in this regard. We will soon have all vessel owners agreeing with us in the statement that our work is first to give their vessel an honest class and then protect that class in dealings with the underwriter when the ship gets in trouble. I say we are making decided progress along this line for the reason that the Register is now in the hands of underwriters at home and abroad. All the leading companies are subscribers and are writing ships according to Great Lakes Register classes. We have vessel owners by the dozen applying for and receiving certificates of class every day, and the work is progressing with full satisfaction, in view of the great undertaking involved in the Regiter, and the radical departure from old and unsatisfactory methods which it represents.

"The organization of the Salvage Association of North America is another move in the right direction. This association, which will have Capt. Cyrus Sinclair as chief wrecking master, with headquarters in the Royal Insurance building, Chicago, will relieve the Register force from any connection whatever with wrecking work. Their regular duties were interfered with by reason of their service being divided at times on Salvage affairs. Now their duties will pertain only to the classification of ships, which will be the sole work of the Register force, unhampered by outside connections of any kind and free to serve the ship owner by giving him a class and seeing that his rights are protected in event of the ship meeting with accident."

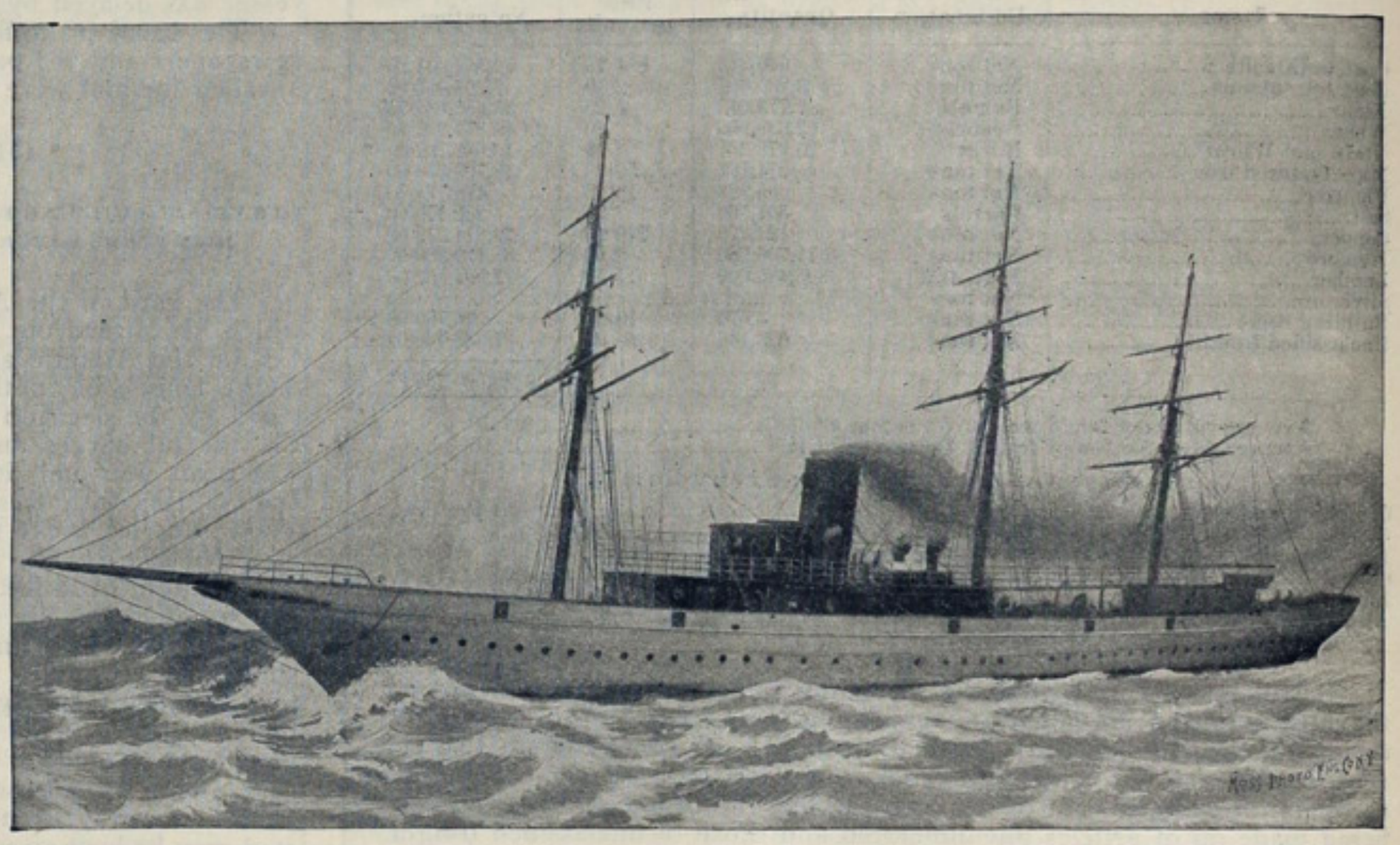
SHIP BUILDING IN THE UNITED KINGDOM.

Ship building returns compiled by Lloyd's register for the first quarter of the present year show that on April 1 there were under construction in the United Kingdom a total, exclusive of warships, of 579 vessels aggregating 1,385,715 gross tons. Of this number 508 vessels of 1,372,045 tons are of steel, as against 525 vessels of 1,172,203 tons during the corresponding quarter in 1898. Of iron there are fifty-seven vessels of 10,003 tons, as against fifty-two vessels of 8,698 tons during the corresponding three months last year. The decadence of the sail vessel is shown by the fact that at the present time but twenty-nine are building, of which five are of steel. Work was begun during the quarter on 175 vessels of 347,013 tons and there were launched 162 vessels aggregating 300,250 tons. Of the vessels at present on the stocks, fifteen are of more than 10,000 tons each, while thirty-four are between 4,000 and 5,000 and an equal number between 5,000 and 6,000. There are under construction in the United Kingdom also a total of eighty-six warships of 434,065 tons, of which seventeen vessels of 152,870 tons are building at the naval dock yards and sixty-nine vessels of 281,195 tons at private yards.

NOVEL TYPE OF STEAM YACHT.

The Review presents herewith an illustration of Commodore Archibald Watt's twin-screw steam yacht American, one of the most interesting steel yachts ever built in this country, and which is now fitting out for a tour around the world. This yacht, which was designed by her owner, was built by the Johnson Engineering & Foundry Co. of New York and is 254 feet over all, 38 feet beam and 21 feet depth of hold, and draws 12½ feet of water. She has two quadruple expansion engines of 3,200 horse power and her estimated speed is 17 knots an hour, which is due in a considerable extent to the fact that she is fitted with one of the famous Case outward thrust propeller wheels, manufactured by A. Wells Case & Son of Highland Park, Conn. The American has a coal capacity of 650 tons which would prove sufficient for a 65-day cruise.

Commodore Watt, who has at one time or another designed naval vessels, set out to gratify his wife's ambition for a cruising yacht that could not be burned, sunk or dangerously broken on the rocks, and the American is the result. Many officers of the United States navy have examined the yacht, either officially or for their own instruction. Chief Engineer George W. McGee, one of the government experts, is reported to have declared that the hull includes greater precautions against sinking than any battleship afloat, and that the success of Watt's invention will probably lead to many changes in the building of ships for both war and commerce. The yacht has sixteen watertight compartments on either side of the keel. Above these lower compartments are nine steel bulkheads, which reach to the upper deck, two of them separating the deckhouse. The steel keelson is only four inches narrower than those used in the St. Paul and St. Louis. The frames of the steel ribs are Z shaped, whereas those in the Maine, reported to have been the strongest vessel of her size in the navy, were L shaped, although of the same thickness. All the decks are of steel, together with the two deckhouses, which are 70 and 40 feet in length respectively. The yacht will carry two 25-foot naphtha launches with alco-vapor motors, one large steam launch, a 31-foot gig, lifeboat and dingy. The American is equipped with a complete outfit of Blake pumps, including vertical twin air pumps similar to those furnished by the Blake company for vessels of the United States navy and revenue cutter service.



COMMODORE WATT'S STEAM YACHT AMERICAN, FITTING OUT FOR A TOUR AROUND THE WORLD.

A freight steamer building by the Ottawa Forwarding Co. at Ottawa, Ont., is rapidly nearing completion and will be ready for a trial trip by May 1. She is 112 feet in length, 24 feet beam, 9 feet depth, will have a capacity of 300 tons and will cost when completed in the neighborhood of $20,000. She will be fitted with high pressure engines and a Fitzgibbon marine boiler of 130 pounds pressure.

A Canadian correspondent says:—"There is going to be a renewal of the rate war which was waged so merrily last summer on the Thousand Islands' route between the Richelieu & Ontario Navigation Co. and the Folgers of Kingston. An effort was made this spring to effect a compromise and divide the business, but the negotiations broke down. A report is also going the rounds that the New York Central Ry. Co. will operate an independent line in opposition to the Richelieu & Ontario."

The Federal Steel Co.'s new steamer Pennsylvania is to be packed throughout with Garlock packings, supplied by the Cleveland office of the Garlock Packing Co. Other late orders secured by this firm include a large amount of packing for the Cleveland & Buffalo and Cleveland-Cliffs fleets.

The Sterling Co. of Chicago recently made a shipment of their water tube safety boilers, amounting to 1,000 horse power, to South Africa, for use in mining plants there. The order, which was received direct from Herbert Ainsworth, Johannesburg, was valued at over $10,000.

Ten days stop-over at Washington—Tickets to Philadelphia and New York over Pennsylvania short lines may be obtained via Washington, and good for a ten days' visit at the national capital, at the same fare as apply to Philadelphia and New York over direct lines of Pennsylvania system. For further particulars apply to Pennsylvania lines ticket agents or address C. L. Kimball, passenger agent, Cleveland, O.

THE NEW TORPEDO BOATS AT RICHMOND.

During a recent conversation with a representative of the Marine Review William R. Trigg, president of the Trigg Co. of Richmond, Va., America's newest ship building concern, when asked how he came to enter the business of building vessels, said: "Well, I hardly know, unless it was from the fact that we built the machinery for the battleship Texas at the Richmond Locomotive Works, with which I have been connected for a long time." Mr. Trigg still retains an interest in the locomotive company but is devoting his entire time of late to the conduct of affairs at the ship yard. According to late reports from Richmond excellent progress is being made with the torpedo boats and destroyers under construction at the Trigg works for the United States government. The company has gathered together a most competent staff of draughtsmen, who were secured from yards in all parts of the country. The draughting room at the Richmond works is 30 by 73 feet in dimensions and well lighted. It is in charge of F. E. Pratt, while Naval Constructor McDonald and Assistant Naval Constructor W. Strother Smith represent the navy department in the large amount of inspection work that is necessary at all ship yards engaged in government contracts. Mr. Trigg also stated to a representative of the Review that the machinery equipment installed at the Richmond works has to a considerable extent been selected with reference to immediate needs for torpedo boat work, and for this reason it was necessary to take in some second-hand machinery. Later this will be replaced by a complete modern equipment. Much of the new machinery thus far purchased has been supplied by Manning, Maxwell & Moore. The ship shed, which, although not large, is one of the finest in America, is 50 feet wide by 130 feet length. The Trigg Co. has railroad connection with both the Chesapeake & Ohio Railway and the Southern Railway.

CANADIAN CANAL COMMERCE.

A comprehensive resume of Canada's canal commerce and of expenditures for canal purposes by the Dominion government is contained in the recently issued report of the department of railways and canals. The total expenditure on original construction and the enlargement of the various canals up to June 30, 1898, was $87,573,498.16. The total rental derived, including tolls, was $11,710,240.08. The expenditure for the year ending June 30 last was $3,207,249.79 on construction and enlargement and $624,755.96 for repairs, etc., making a total of $3,382,005.75. The net canal tolls amounted to $344,057.13.

It is unfortunate that the statistics of canal commerce in these reports are not brought up to a late date. During the season of navigation in 1897 there was moved through the Welland canal 1,274,292 tons of freight, a decrease of 5,695 tons as compared with 1896; of this amount 1,050,093 tons passed eastward and 224,109 tons westward; 1,244,750 tons were through freight, of which 1,026,458 tons passed eastward. Of this through freight Canadian vessels carried 345,773 tons, an increase of 4,847 tons, and United States vessels carried 898,773 tons, a decrease over the preceding year of 3,692 tons. The total freight passing through the canal eastward and westward from United States ports to United States ports was 564,694 tons, a decrease of 88,519 tons as compared with the season of 1896.

The quantity of grain passed down the Welland and the St. Lawrence canals to Montreal was 560,254 tons, an increase of 99,205 tons compared with the previous year; of this 89,659 tons were transhipped at Ogdensburg, as against 461,049 tons carried down in 1896, of which 77,355 tons were transhipped at Ogdensburg. The further quantity of 43,023 tons of grain passed down the St. Lawrence canals only, to Montreal, making the total 603,277 tons. On the St. Lawrence canals 1,231,365 tons of freight were moved, an increase of 117,675 tons; of which 813,638 were east bound through freight, and 23,831 tons west bound through freight; 746,537 tons were agricultural products, 331,620 tons merchandise, and 94,496 tons forest products.

The Roach ship yard, Chester, Pa., has let the contract for 1,500 tons of steel plates for one of the large steamers to be built for Hawaiian service to the Central Iron & Steel Co. of Harrisburg, Pa.

MARINE ENGINEERS.

REGULATIONS FAR MORE EXACTING THAN THOSE PREVAILING IN THIS COUNTRY HAVE RECENTLY BEEN ADOPTED IN ENGLAND BY THE BOARD OF TRADE.

New regulations for the examination of marine engineers by the board of trade have recently been adopted in England. They are far more exacting than the rules of the United States steamboat inspection service. Five years of machine shop work experience will hereafter be required and sea service alone will no longer qualify a candidate for examination. The rules are discussed very interestingly in the following extract from Fairplay of London:

"The examinations of the board of trade have long been, in the opinion of marine engineers, somewhat lax. For the fitting together of engines and machines, and for their repairs, engineers on shore have the rule that workmen must have served five years before they can be considered fit and proper journeymen. Before master engineers will pay journeymen's wages they insist that the discipline of the apprenticeship should be gone through. And among workmen themselves it may be said that no workman is respected by his fellows as a properly trained artisan unless he has complied with this unwritten law. Now though ability to efficiently execute repairs is so essential in the shops, it is quite as necessary on board ship, where delays may mean loss of time for the ship and loss of money for the ship owner. Yet the regulations for a certificate of efficiency to work engines on board ship have not in the past required that a full apprenticeship should have been served before application for the certificate has been made, and so it has been possible for men to obtain this certificate of efficiency after they had been to sea as engine drivers, while they had not served an apprenticeship in the shops at all.

"Now all that has changed. It will not now be possible for any man who has learned to take charge of engines at sea to obtain a certificate of efficiency from the board of trade. An applicant must have first gone through a proper apprenticeship as an engineer before he can apply for his certificate of efficiency, and the time he must serve is five years. This is the time should he claim on his shop work experiences, but twelve months are allowed off this when he has passed through technical schools. But here is the rule itself: 'Candidates for second-class certificates must serve as apprentice engineers for five years instead of three years; three years of the five must have been spent fitting or erecting; no service in drawing-office or boiler yard will count for more than twelve months; time spent in technical schools may be accepted under certain conditions; all applicants to produce testimonials of ability as an engineer workman. The sea service required cannot be performed in vessels with engines of less than 66 n. h. p. Sea service alone will no longer qualify a candidate for examination.'

"At the present time there are no testimonials of ability given to engineer workmen. When a workman seeks employment he calls at the workshop or factory gate, and should a man be required, he may be taken on, and it is soon found out what he can do. Should he have little or no ability, he is kept on at low wages or discharged at once. Should a workman be applying for a higher job than that of workman, he may ask and receive a testimonial, but this is mainly as to his sobriety—his ability as a workman and character is fairly well known. The testimonials of ability will therefore be a new thing in the country, and it would be well could they be regularized under some well-thought-out system, on the same lines as the certificates of efficiency of the board of trade for sea-going engineers. But there is another regulation which limits the direction in which the board of trade intends it to go. This rule reads: 'All applicants will be required to produce, in addition to the official discharge certificate, testimonials as to their workshop service and as to their service at sea. The testimonials as to workshop service must be signed by the employer, and must testify to the applicant's conduct and ability, and state what kind of work he was engaged in (e. g., fitting, erecting, etc.) and for how long.' Here rightly enough, the responsibility of the employer is called in for the proper training of the young engineer under his charge. And it is satisfactory to find there is no shrinking of the employer from this responsibility. It is a responsibility which the board of trade is not thrusting on an unwilling person. The employers in many cases have already taken up this responsibility, and in providing classes or prizes, or in some way, take a decided interest in their apprentices. But the problem remains in what manner is the responsibilty of the employer to be used in bringing under a regularized system the certificates of efficiency of apprentices when they have served their five years. That is the problem which will meet us immediately.

"The service at sea has also to be performed, and a certificate that the time has been put in has also to be presented when application is made. These must be signed by the master and chief engineer of the ship on which the service has been made. The rule bearing on that reads as follows: 'Testimonials as to service at sea must testify to the applicant's sobriety, experience, ability, and general good conduct for at least the twelve months' service at sea preceding the date of application to be examined. They must be signed by the master and chief engineer (or in the case of testimonials to chief engineers, by the master and superintending engineer), and musts clearly state whether the applicant was on regular watch on the main engines or boilers. It is desirable that testimonials of candidates should be endorsed by the superintending engineer. No time spent in clerical work will be allowed to count.' The whole point of this last rule is the interest in and knowledge of his men which the superintendent engineer must possess before he can endorse any testimonials for them. And when this condition of things has been brought about, when the superintendent knows his men and their abilities, and the men also know that they cannot receive a certificate without pleasing him, there will be created a state of feeling in the marine engineering workshops of the country which the well-wishers of the men have striven after for a long time. It is the wish of these that as near an approximation to the mediæval system of apprenticeship as possible may be attained. It may not be possible in the present state of division of labor to provide that the apprentice should begin at the forgings and end off at the fitting of the engine, but that should still be aimed for. He should know and he should be able to put his hand to almost anything, if not in the workshops, then at the technical college. Above all there should exist that state of feeling between the superintendent engineer and his men which existed between master and men in mediæval times, and this, we think, will be the directive tendency of the new rules for the examinations of marine engineers under the board of trade."

NEW ARGENTINE CRUISER.

The latest addition to the Argentine navy is the armored cruiser General Belgrano, recently completed by Messrs. Orlando Brothers, Leghorn. She very closely resembles the General San Martin, her dimensions being: length between perpendiculars, 328 feet; beam, 61 feet 10 inch; moulded depth, 40 feet; mean normal draught, 23 feet 3½ inch; and her displacement, 6,882 tons. Her hull is of steel and is divided into numerous watertight compartments. She has a complete armor belt of 6 inch maximum thickness, and an upper and lower armored deck. The former is 37 mm. thick, and covers the battery of 152 mm. guns, and extends from side to side of the ship. The lower armored deck is situated in the usual position, is 40 mm. thick beneath the battery, reduced to 20 mm. fore and aft. Between the two decks, at each end of the battery, there are stout armored bulkheads 120 mm. thick. The battery is thus made into a complete armored box. The armor is of nickel steel, manufactured at the Terni steel works.

The armament consists of two 254 mm. Elswick guns mounted in barbettes on the upper deck, one at each end of the redoubt; ten 152 mm. Elswick guns in the redoubt, and four in the ends of the redoubt, able to fire fore and aft; two 75 mm. Vickers-Maxim guns on the main deck; ten 57 mm. Elswick guns; eight 37 mm. Maxim guns; two 75 mm. Maxim-Nordenfelt; and four torpedo tubes placed at the two sides of the lower deck. There are also the usual field carriages, with guns of small calibres. The ammunition is supplied by electric and hand elevators similar to those on the General San Martin.

The General Belgrano is propelled by two triple expansion engines of 8,600 indicated horse power under natural draft and 13,000 indicated horse power when forced. The diameter of the propellers is 4.876 m., and the pitch 7.190 m. Steam is supplied by eight cylindrical boilers, arranged in two groups fore and aft of the engine room. The engines and boilers were supplied by the Societe Industriale Napoletana, Hawthorn, Guppy & Co., Naples. The vessel has a large electric installation, providing current for general lighting, for ventilators and capstans, for the ammunition hoists, and for five search lights. Four of the search lights are 60 cm. diameter, and are situated on the battery, and one of 75 cm. placed in the foretop, which can be directed by electric motors from a distant station.—Engineer, London.

Major Clinton B. Sears opened proposals at Duluth a few days ago for furnishing about $12,000 worth of material for concrete super-structure work on the breakwater at Marquette. Among successful bidders were the following: Wm. T. Berthelet of Milwaukee, Keystone cement at $1.04 per barrel; Kelley Island Lime & Transport Co. of Cleveland, Lehigh cement at $2.35 per barrel; Nelson D. Hodgkins, of Marquette, broken stone at $1.60 per cubic yard; Alexander Lang of Duluth, sand at 45 cents per cubic yard. An order for bar iron, nails, nuts and bolts, etc., to be used on the work goes to the Marshall-Wells Hardware Co. of Duluth. Other bidders were F. B. Spear & Sons, and Powell & Mitchell of Marquette and Thompson C. Gill & Co. of Philadelphia.

The Bethlehem Steel Co. has assumed the franchises, property, etc., of the Bethlehem Iron Co. by a lease which was ordered granted at a meeting of the stockholders. The new company has a capital stock of $15,000,000, and makes a guarantee rental of 6 per cent. per annum on the capital stock of the old company, which is $7,500,000, payable quarterly, free from all taxes and deductions. The officers of the new company elected by the incorporators are: Robert P. Linderman, president; Abram S. Schropp, secretary and C. O. Brunner, treasurer. The directors are Joseph Wharton of Philadelphia; Robert H. Sayre and Robert P. Linderman of Bethlehem; Beauveau Borie, Edward T. Stotesbury and John Lowber Welsh of Philadelphia.

The Chicago Pneumatic Tool Co. announces a couple of valuable additions to its working force—Messrs. W. P. Pressinger and J. M. Towle. Mr. Pressinger is well known to users of compressed air everywhere, through his long connection with the Clayton Compressor Works. He will be in the New York office of the Chicago company. Mr. Towle, who will open an office in Boston, has been for the past ten or twelve years engaged in the manufacture and sale of pneumatic tools. He is an expert in that line, well known throughout the east. This arrangement gives the Chicago Pneumatic Tool Co. offices in Chicago, New York, Boston, Buffalo, Pittsburg, St. Louis and San Francisco.

One of the most striking and artistic examples of color printing which have been shown in this country in many a day is embodied in the invitations which have just been issued by the Berlin Iron Bridge Co. of East Berlin, Conn., to the sixth annual oyster roast given by the company to its employes and their families last Wednesday evening. This annual social event is always conducted on a big scale by the Berlin company.

James Shewan & Son of New York city launched at the Erie basin a few days ago a new floating dry dock of 3,000 tons capacity. The dock is 202 feet in length, while the outriggers give it an additional length of 73 feet. The width over all is 87 feet and inside or clear deck 69 feet, affording ample opportunity for docking vessels of a large type.

AMERICAN IRON, STEEL AND SHIP BUILDING.

Above is the title of an article in a recent issue of the London Statist, in which the admissions made as to the future of the American export trade in iron and kindred interests are of a very encouraging kind. Our iron and steel manufacturers are just now so crowded at home that export trade is not for the present being developed as it had been, but it is certain to be taken up again with renewed vigor when home requirements are more fully cared for.

"Perhaps the most important economic question of our time," says the Statist, "is connected with the development of the iron and steel industries of the United States, and the probable consequences of that development, not only on the cognate industries of Europe, but also on the whole maritime relations of the commercial world. Reduced prices in America are not due to competition alone, but largely to the reduced cost of material and greater economy in production. It is, of course, the reduced cost of production that has given America a chance in foreign markets that she never had before. The surplus of many American manufacturers has been often enough dumped into foreign countries, especially Canada, in order to relieve the home markets. But the business now being done by Americans in iron and steel cannot be regarded as of the dumping character. They are cultivating an export trade, and with such success that in the year ending June 30 last the exports of raw and manufactured iron and steel amounted to $70,367,527, as against $57,497,872 in the previous year. These exports consisted of 235,868 tons of pig iron, 232,552 tons of railway iron, 64,745 tons of iron wire, 60,195 tons of scrap iron, 30,585 tons of structural iron and 16,100 tons of steel billets and ingots. The total quantity of all sorts sent to Great Britain was 150,000 tons, and nearly all the rest was sent to countries accustomed hitherto to buy from us. In the nine months ending Sept. 30, 1898, the exports of steel rails amounted to 222,973 tons, valued at $4,465,087. These figures compare with 88,573 tons and $1,891,724 in the corresponding portion of 1897, and with 50,841 tons and $1,189,106 in the corresponding portion of 1896. The largest buyers of the increased quantity have been Canada and Japan, and it is well to remember that it was stated in parliament last session that the lowest tenders for rails for the supply of the Indian railways were American. As to Japan, which used to get all her rails from us, we note the following in a special report by Mr. Lyon, United States consul at Hiogo: 'In 1896 the United States exported to Japan only a little more than one-sixth as much railway iron as England did; but in 1897 a very notable increase took place from the United States in such shipments, and exportations from the two countries stood thus: Great Britain, $810,091; United States, $625,083. At this rate another year will show the United States to have left its competitor in this export far behind.' That may or may not be, but the enormous advance possessed by the United States in the coming market for railway iron in China is an important factor in the development of production now taking place. That development has gone on to steel ship plates, which are now being shipped to this country for ship building.

"The point we have sought to bring out is that America has now so developed her iron and steel industries that she must find fresh outlets for her products, especially when the present rush at home is over with. Such outlets she is finding, as we believe, with profit in foreign markets for certain products. For other products, however, she will need to create a new ship building industry of her own. No thoughtful man, acquainted with the American character, who considers the situation can fail to perceive that the greatest competition to be faced by British industry and enterprise in the future is that of American ship building. It may be deferred a few years, but it is bound to come."

THE WORLD'S IRON ORE CONSUMPTION.

"From the national point of view," says the London Statist, "it is not agreeable to find that while twenty years ago we produced 50 per cent. of the world's pig iron, we now furnish less than 25 per cent. America has taken the lead since 1890, and will easily keep it. The following represents the world's output of pig iron in 1898:

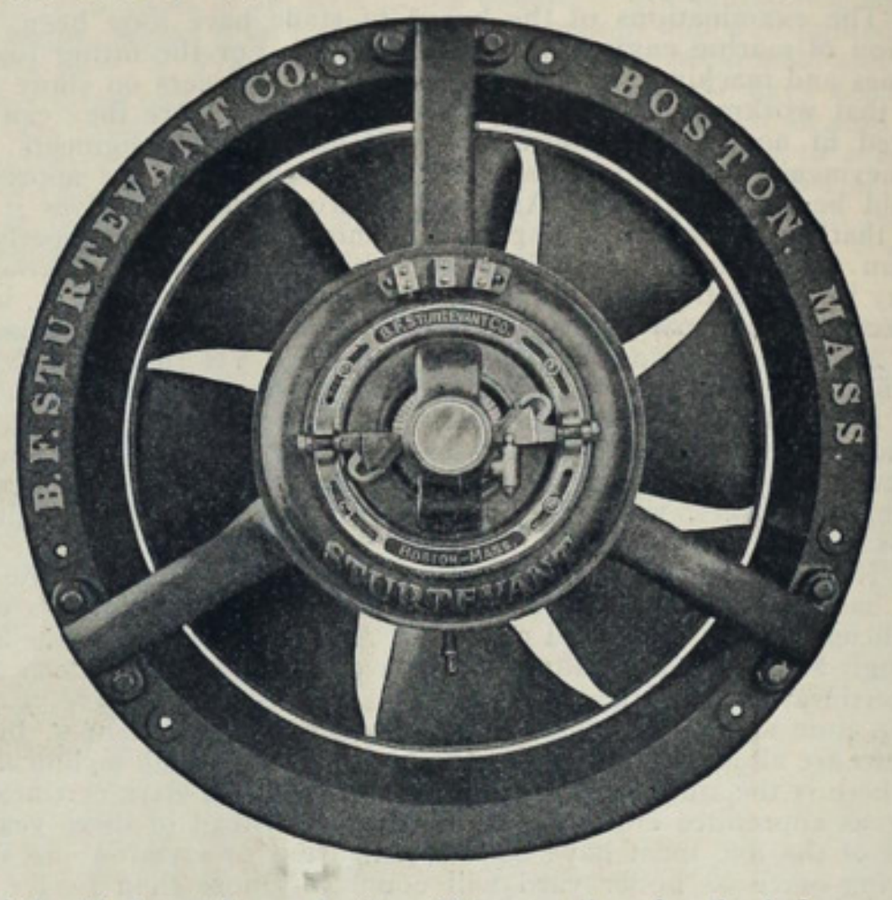
	TONS.		TONS.
United States	11,774,000	Austria Hungary	1,200,000
Great Britain	8,631,151	Belgium	980,000
Germany	7,402,717	Sweden	560,000
France	2,000,000	Spain	300,000
Russia	1,750,000	All other countries, say	402,132
Total			35,000,000

On the basis of two tons of ore to one ton of pig, this means a consumption of 70,000,000 tons of iron ore per annum. Is there a supply of ore in sight in the world to permit of an increase in the world's production of pig iron by 25 per cent? If not, it is difficult to see how the growing demands for iron and steel are to be met. But, of course, the demands may cease to grow."

Capt. Cyrus Sinclair, well known as a wrecking master, is to be engaged during the coming season with the Prime-McCurdy interests of Chicago.

ELECTRIC PROPELLER VENTILATING FAN.

Since the B. F. Sturtevant Co. of Boston, Mass., has entered extensively upon the manufacture of electric motors and generating sets, it has been carefully studying the problem of the manufacture of a compact, efficient and convenient type of electric ventilating fan. Exhaustive tests were made with different types of fan wheels. The result is rendered clear by the accompanying engraving, showing a front view of an electric ventilating fan that has just been put upon the market. The fan wheel has eight blades, rigidly attached to a spider at the center and held in place by a hoop at the periphery at an angle of approximately 30 degrees. The angle is increased in such a manner that as the center is approached the theoretical velocity of the air remains practically constant. In other words, the delivery edge is helical and the air is picked up on the inlet



edge of the blades at low velocity. When well under the influence of the blades it is accelerated to its maximum velocity with the least amount of slip. The result is an extremely efficient wheel. The motor likewise has been the result of very careful study in the attempt to provide a light machine, entirely enclosed, and at the same time to avoid the excessive temperature which is incident to the operation of most enclosed motors. It is claimed for this machine that it is capable of continuous operation for ten hours, with a maximum temperature rise of not exceeding 30 degrees Fahrenheit. A practical efficiency of over 80 per cent. is claimed, even with the small-sized motors, and an excess load of 75 per cent. above the rated capacity may be carried without sparking and without change of brushes. This feature combined with the small temperature rise allows of carrying temporary overloads with impunity. The bearings are self oiling and self aligning, and are fitted with phosphor bronze sleeves, which are removable from the outer ends of the boxes. This wheel is partially enclosed within a conoidal inlet ring, which decreases the frictional resistance to the entering air, and furnishes at the same time a rigid support for the motor to which it is attached by the tripod hanger. These fans are built in sizes from 18 inches to 120 inches, with motors designed for either medium or maximum speed, and to run at any ordinary direct current voltage. A speed controller is always provided, by means of which the fan can be efficiently operated at different speeds.

The wreck of the Spanish torpedo boat destroyer Pluton, which was sunk during the battle of Santiago, has been discovered by divers. The hull was found lying on the port side and with no indication of having been struck by a heavy shell, as had been reported. The vessel is, however, very badly stove in.

The 1899 catalogue issued by A. Wells Case & Son of Highland Park, Conn., manufacturers of the perfected outward thrust propeller wheel, not only contains a full recital of the many advantages claimed for this type of wheel but appends dozens of strong testimonials from owners of craft of all kinds who have them in use.

IMPORTANT MOVEMENTS ON FOOT.

Rumor in the iron trade has been busy in the past week with talk of contemplated movements affecting in an important way two leading companies. Chicago financial columns, which have been quite well informed on developments in companies which the Moore Brothers have been instrumental in organizing, have referred to the probability that the National Steel Co., the American Tin Plate Co. and the American Steel Hoop Co. would be brought together in one organization. The three are close together now, three persons being common to their executive committees—W. B. Leeds, D. G. Reid and W. H. Moore. It is understood that an important announcement concerning the National Steel Co. will also be made in the near future.

The other company whose future has been under discussion in the week is the Carnegie Steel Co., Ltd. It has been understood for some time that this company, whose partnership period expires in 1901, has been planning to incorporate as a stock company. The capitalization now is $25,000,000. Under the proposed arrangement a capital of $200,000,000 might be authorized. A new corporation act recently passed at Harrisburg, and known as the McClain law, provides for the formation of corporations and for removing the limit of capitalization, which has been $30,000,000. It is believed the plans for the Carnegie Steel Co. will soon be consummated and that the personnel of the new interests that will come into the corporation on the broader basis will be such as to indicate that the big producers of iron and steel mean to preserve profitable prices and avoid conflict.—Iron Trade Review.

The annual meeting of the stockholders of the Joseph Dixon Crucible Co. was held at the company's main office, Jersey City, N. J., Monday, April 17, and out of a possible vote of 7,345 shares there were 7,069 shares voted for the re-election of the old board, consisting of Edward F. C. Young, John A. Walker, Daniel T. Hoag, Richard Butler, William Murray, Alexander T. McGill and Joseph D. Bedle. Officers re-elected are: President, E. F. C. Young; vice-president and treasurer, John A. Walker; secretary, Geo. E. Long. Judge Joseph D. Bedle was also re-elected as counsel.

The cargo steamer building at the works of the Chicago Ship Building Co. for the Minnesota Steamship Co. will be named Maunaloa. The steel barge building at the same works for the same company will be named Manila.

The steamer J. C. Lockwood will hereafter be known by the name Case—F. B. Case, managing owner, J. D. Peterson, master, and F. P. Fitzgerald, chief engineer.

Geo. Treviranus has been appointed ore dock agent of the D. M. & N. Ry. at Duluth, succeeding W. S. Brann, who resigned some time ago.

UNITED STATES Engineer Office, 1637 Indiana Ave., Chicago, Ill., March 31, 1899. Sealed proposals for constructing thirteen miles, or less, of Feeder of Illinois and Mississippi Canal, from mile 17 to mile 29, south of Tampico, Ill., will be received here until 12, noon, central time, May 9, 1899, and then publicly opened. Information furnished on application here, or to Assistant Engineer L. L. Wheeler, Sterling, Ill. W. L. Marshall, Maj. Engrs.
May 6.

Sealed proposals will be received at the office of the Light House Engineer, Milwaukee, Wis., until 3 o'clock p. m., May 12, 1899, and then opened, for the services of a steam barge or steamer of about 500 tons freight capacity for general service as a Light House tender for the Ninth District for the season of 1899. Specifications, form of proposal and other information may be obtained upon application to J. G. Warren, Capt., Corps of Engrs., U. S. A. April 27.

PROPOSALS FOR DREDGES.—Mississippi River Commission, Fullerton Building, St. Louis, Mo., April 19, 1899.—Sealed proposals, in triplicate, for construction and delivery of two self-propelling hydraulic dredges complete with machinery, cabin, outfit, etc., will be received here until 12 o'clock noon, standard time, May 31, 1899, and then publicly opened. Information furnished on application. Mason M. Patrick, Capt., Engrs, Sec'y. May 25.

U. S. Engineer Office, 1637 Indiana Ave., Chicago, Ill., April 25, 1899. Sealed proposals for dredging in Calumet River will be received until noon (central time) May 25, 1899, and then publicly opened. Information furnished on application. W. L. Marshall, Maj., Engrs. May 18.

U. S. Engineer Office, D. S. Morgan Building, Buffalo, N. Y., April 1, 1899. Sealed proposals for hire of dredging plant for excavation in Niagara River will be received here until 11 o'clock a. m., May 20, 1899, and then opened. Information furnished on application. T. W. Symons, Major, Engrs. May 11.

U. S. Engineer Office, 57 Park St., Grand Rapids, Mich., April 19, 1899. Sealed proposals for repairing government pier at Saint Joseph, Mich., will be received here until 3 p. m., May 19, 1899, and then publicly opened. Information furnished on application. Chester Harding, Capt., Engrs.
May 11.

U. S. Engineer Office, Milwaukee, Wis., April 10, 1899. Sealed proposals for dredging at: Menominee River, Oconto, Green Bay, Two Rivers, and Milwaukee harbors, will be received here until 12 o'clock noon, standard time, May 17, 1899, and then publicly opened. Information furnished on application. J. G. Warren, Capt., Engrs.
May 11.

U. S. Engineer Office, Milwaukee, Wis., April 20, 1899. Sealed proposals for Harbor of Refuge Milwaukee Bay, Wis., breakwater construction; Racine Harbor, Wis., crib pier, breakwater, removal of old pier, and dredging; Kenosha Harbor, Wis., pile and crib piers, crib breakwater, removal of old pier, and dredging; will be received here until 12 o'clock noon, standard time, May 25, 1899, and then publicly opened. Information furnished on application. J. G. Warren, Capt., Engrs.
May 18.

SEALED proposals for furnishing about twenty-four thousand tons of armor for naval vessels will be received at the Navy Department until 12 o'clock, noon, Wednesday, May 31, 1899, when they will be publicly opened. Forms of proposal and all information may be obtained from the Chief of the Bureau of Ordnance, Navy Department, Washington, D. C. Chas. H. Allen, Acting Secretary.
3-29-99—May 11

U. S. Engineer Office, D. S. Morgan Building, Buffalo, N. Y., March 29, 1899. Sealed proposals for Construction of Concrete Superstructure on Breakwater at Buffalo Harbor, N. Y., will be received here until 11 o'clock A. M., May 10, 1899, and then opened. Information furnished on application. T. W. SYMONS, Major Engrs. May 4